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IN MEMORIAM.

Alonzo F. Lea, a deputy of the Fish and Game Commission for many years, died in Santa Rosa on October 26, 1916. A week previous he fell from a step-ladder while repairing an awning at his home in Cloverdale and fractured his skull. At the time it was realized that he was dangerously hurt and as soon as possible he was taken to the hospital at Santa Rosa, where the best of medical skill was available. During the few days that he lingered, he never fully regained consciousness, and died without recognizing those closest to him.

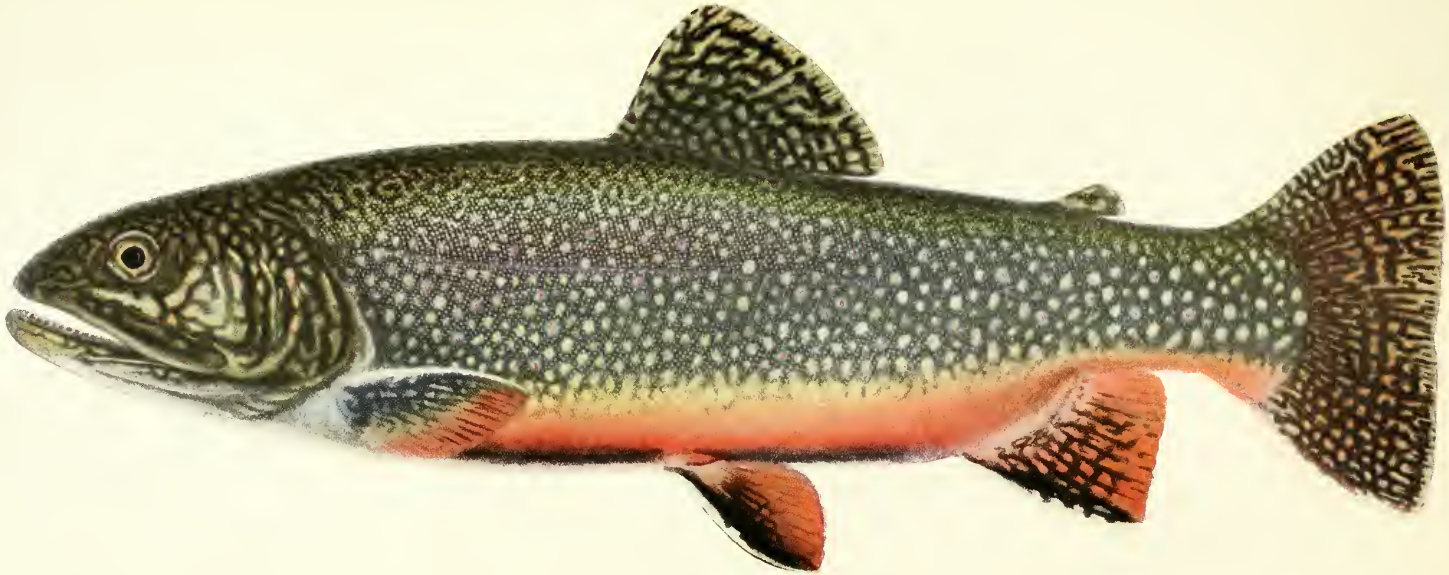
Lea's work for game conservation began during the nineties. In the early days he was detailed to various parts of the state, but his best work was accomplished in Sonoma, Lake and Mendocino counties. His familiarity with the roads and trails, his fearlessness, his extensive acquaintance in all parts of these counties made him a particularly valuable man. The fact that the counties in which he worked are well supplied with game today is largely due to his conscientious work.

He was buried at Kelseyville, Lake County. Notwithstanding the comparative inaccessibility of this town, hundreds of friends came from distant places and many of the public officials of Lake County were present at the funeral. He was borne to his last earthly resting place by associates in the employ of the Fish and Game Commission.

It is difficult to express in words the sentiment that fills us at the burial of a loved and respected friend. The tribute paid him at the grave by his former chief, Charles A. Vogelsang, was fitting and most appropriate. It was as follows:

"We, his former associates and comrades, have come here today to pay our last tribute of respect and affection for one who was our friend, a true soldier in the ranks. His work was characterized by courage, loyalty and integrity. He rendered a great service to the nation and the state. In the performance of his difficult duty he made no enemies, only new friends.

"Of him it can be truly said, 'his life was gentle and the elements so mixed in him that nature might stand up and say to all the world, he was a man.'"
—J. S. H.



—*From drawing by Charles Bradford Hudson*

EASTERN BROOK TROUT *(Salvelinus fontinalis)*

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 3 SAN FRANCISCO, JANUARY 20, 1917 Number 1

HISTORY OF THE INTRODUCTION OF FOOD AND GAME FISHES INTO THE WATERS OF CALIFORNIA.*

By W. H. SHEBLEY, in charge Fish Culture, California Fish and Game Commission.

The California Fish Commission during the first decade of its existence introduced into the waters of this state a number of varieties of food and game fishes and the attending results are regarded as being among the greatest achievements in fish-culture and acclimatization. The only work of the kind that will bear favorable comparison is the introduction of food and game fishes into New Zealand. The success of the work was due largely to the untiring efforts of Dr. Livingston Stone, a fish-culturist of that day, in the employ of the New York Fish Commission; and to the study and the practical work of Mr. J. G. Woodbury, who later became Superintendent of Hatcheries for the California Fish Commission.

The most important work in the introduction of new fishes into the state was accomplished during the period from 1870 to 1883; following this came the preservation of the fishes, and the artificial propagation of the native species on a large scale, to multiply their numbers to meet the demands of commerce and of an increasing population.

Since its initial organization in 1870, the Fish and Game Commission has introduced into the waters of California about thirty new varieties of fish, with varying degrees of success. Following is an account of the species introduced, the dates of introduction, and the results obtained:

1. In 1871, the State Fish Commission secured the services of Mr. Seth Green, the noted fish-culturist, to superintend the transportation of a consignment of shad fry across the continent from New York to California. Mr. Green and an assistant left Albany, New York, on June 19, 1871, with 12,000 young shad fry (*Clupea sapidissima*) and arrived at Sacramento on June 26th. The same day the fish were planted in the Sacramento River, at Tehama. About 10,000 of the fry were in good condition at the time the plant was made. Early in June, 1873, a second shipment of shad was made by Dr. Livingston Stone. The trip across the continent was a joint affair planned by the

[*No state in the Union has been more successful than California in establishing new food and game fishes, but there are comparatively few of our citizens who know the names or the history of the many introductions. It is fortunate that sufficient records have been kept to make possible this outline of the different attempts to introduce desirable species. The present article is an extract from one which appeared in the "California Blue Book" for 1911, pages 513–527. Although some of the scientific names used are obsolete, yet the name used at the time of introduction has been retained without change.—EDITOR.]

federal and the California commissions, and for the first time a car was used especially equipped for the work of transporting the fish. This aquarium car was the property of the United States Fish Commission; it was fitted with tanks for sea and fresh water, ice chests, apparatus for aerating the water, supplies for the attendants, sleeping accommodations, etc. The car carried nearly 300,000 valuable food and game fishes, consisting of ten species. Unfortunately, owing to the collapse of a railroad bridge over the Elkhorn River, in Nebraska, the car was destroyed and the whole consignment was lost. However, this accident did not deter the California Commission from carrying out its purpose of getting a second lot of shad into California. Dr. Stone was instructed to return East and secure another shipment. Accordingly, on the 25th of June, he left Castleton hatchery, in New York, with a third shipment of shad fry and July 2, 1873, 35,000 were planted in the Sacramento River, near Tehama. The expense of this shipment was paid by the United States Commission. Several other shipments were made by the United States Commission between 1876 and 1880. All the shad fry, totaling 619,000, were planted in the Sacramento River, near Tehama. In 1873, two years after the first shad were deposited in the Sacramento River, several mature specimens were taken in San Francisco Bay. The species has continued to increase until it is now one of the most common fish in our waters.

2. The German carp (*Cyprinus carpio*) was first imported into California in 1872, by Mr. J. A. Poppe of Sonoma County. He brought five fish from Holstein, Germany, and put them into his private ponds, where he held them and did a thriving business for a number of years, selling their progeny for purposes of propagation. In 1877, the California Commission exchanged trout eggs with the Japanese Government for 88 young carp, and in 1879, the Federal Commission shipped 298 carp to California; 60 of these were planted in Sutterville Lake, near Sacramento, the remainder in a private pond in Alameda County, where they were at the disposal of the State Commission. During the same year, J. V. Shebley, a fish-culturist and private pond owner in Nevada County, began the propagation of carp; and in 1883, he sold to the California Commission 600 German carp, which were deposited in the Sacramento River, near the city of Sacramento. In 1882, the United States Commission began to deliver carp to private applicants; and in a short time carp were to be found in nearly all public and private waters of the state, in which they would thrive. At the time these plants were made the carp was one of the most popular of fishes; they were recommended as being valuable food fish that would thrive in all of the warmer lakes, ponds, and streams of California. Much has been said for and a great deal more against the introduction of carp into California; but while they probably have been the principal cause of destruction of the California perch, by eating the eggs and digging up the nests, at the same time they furnish the chief food of the black and the striped bass, two varieties of fish whose value more than offsets the damage done by the carp. In time, as other species become more scarce, the carp will probably become one of the state's most valuable food fishes, as it already is in older states and countries.

3. The eastern brook or speckled trout (*Salvelinus fontinalis*) was first introduced into California in 1872. The state purchased 6,000

fish and distributed them equally in the North Fork of the American River, the headwaters of Alameda Creek, and in the San Andreas Reservoir, near San Francisco. The first shipment of eggs (60,000) that produced results was purchased by the California Commission in New Hampshire, in 1875, and hatched at Berkeley. The fry from this lot were distributed principally in lakes and streams in Mendocino, Sonoma, Napa, Yolo, Alameda, and Santa Clara counties, and in Prosser Creek, Nevada County, and the North Fork of the American River, in Placer County. In 1877, 1878, and 1879, eggs were obtained from New Hampshire and Wisconsin, and the resulting fry were distributed over a large area of the state's waters, the North Fork of the American River and the Truckee River receiving the largest plants. The fish planted in the coast streams did not reproduce, but those planted in Siskiyou, Placer, and Nevada counties, and in the high Sierra lakes and streams multiplied remarkably well. In 1890, the work of propagating the eastern brook trout was taken up in earnest and each year the Commission distributes thousands of these trout in nearly every county having suitable waters; they are now one of our most sought after fish.

4. Between 1872 and 1883 the national commission furnished the state commission with six consignments of whitefish (*Coregonus clupeiformis*), aggregating nearly 1,500,000 eggs. The eggs were hatched at Berkeley, at San Leandro, and in a temporary structure erected on Clear Lake, in Lake County, and the fry were distributed in some of the larger lakes and streams of the state that seemed best adapted to the habits of the fish; but they did not thrive. The western or Rocky Mountain whitefish (*Coregonus williamsoni*) found in the Tahoe basin has been often mistaken for the imported species.

5. In 1874, at the request of the California Commission, a second attempt was successfully carried out to bring the common eel (*Anguilla chrisypa*) to California, the first attempt having ended with the disaster to the aquarium car. Of the original shipment, consisting of several thousand small individuals, the loss in transit of the fresh water eel taken from the Hudson River, New York, was almost complete; but twelve survived, and these were placed in a slough of the Sacramento River, near Sacramento; but the salt water eels from New York Harbor stood the journey better, and about 1,500 were deposited in San Francisco Bay, near Oakland. In 1879, Dr. Stone brought out a second shipment of about 500 small eels; these were planted in the Sacramento River. In 1882, Mr. J. G. Woodbury of the California commission transported ten adult eels from the Shrewsbury River, New Jersey, and deposited them in Suisun Bay. There have been no apparent results from any of these plants.

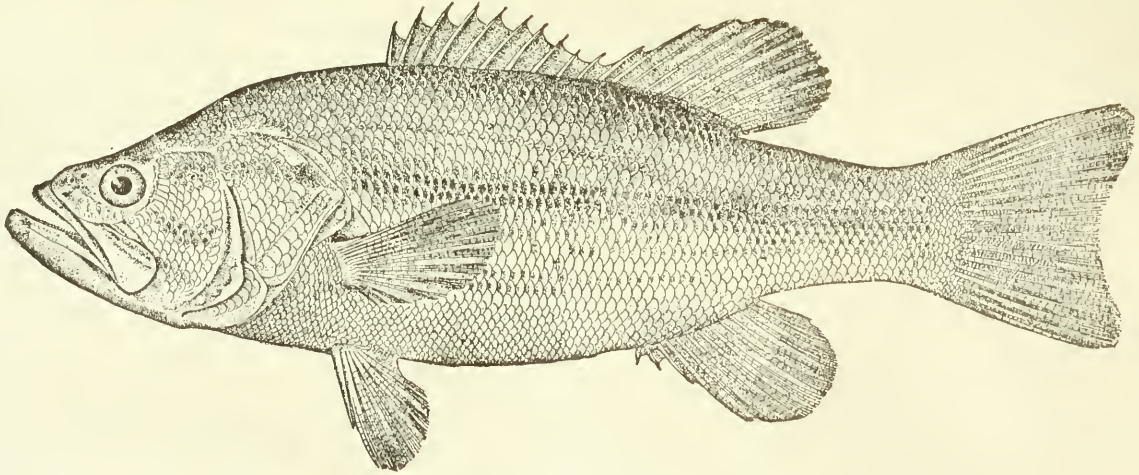
6. The American or eastern lobster (*Homarus americanus*) was first introduced into California waters in 1874, a consignment made the previous year having been lost when the aquarium car was destroyed. Under the auspices of the California commission, Dr. Stone started with 150 full-grown, egg-bearing females from Massachusetts Bay; but four of them reached the coast alive, and these were planted in San Francisco Bay, near Oakland. Subsequently four other small shipments were made, the last in 1888. Plants were made in San Francisco Bay, off Bonito lighthouse, off Point Lobos, to the south of

Carmel Bay, and in Monterey Bay; but although several of those planted in Monterey Bay have been taken by fishermen, no resulting increase in numbers has attended any of the plants made. Thus far the reason for the failure of the lobster to multiply in these waters is not definitely known, as the physical and biological character of the waters of the Pacific Ocean is apparently suitable for its acclimatization.

7. In 1874, several species of catfish were introduced—the common bullhead or horned pout (*Ameiurus nebulosus*), the channel or spotted cat (*Ictalurus punctatus*), the white or Schuylkill cat (*Ameiurus catus*), and one or more species from the Mississippi Valley. On June 12th, fifty-four large Schuylkill catfish from the Raritan River, New Jersey, and the Mississippi catfish, were planted in the San Joaquin River, near Stockton; while seventy bullheads from Lake Champlain, Vermont, were deposited in ponds or sloughs near Sacramento. The Schuylkill cat of the Sacramento River increased very rapidly and soon was as commonly seen in the markets as our native fish.

8. An attempt was made to acclimatize the Atlantic salmon (*Salmo salar*) in 1874, when 305 of the 450 fish brought by Dr. Stone from the Penobscot River, Maine, were planted in the Sacramento River, near Redding. No results were obtained from this plant, as the number of fish planted was not great enough to determine whether they would or would not become acclimated to the waters of the Sacramento. The United States Commission hatched out 200,000 eggs at Fort Gaston, California, in 1890, and in May, 1891, 194,000 fish were liberated in Trinity River; but no run was established.

9. The black basses, both species (*Micropterus salmoides*) the large-mouth and (*Micropterus dolomieu*) the small mouth, have been introduced into California, and have thrived remarkably well. The first shipment, brought out by Dr. Stone in 1874, consisted of seventy-five full-grown spawning bass from Lake Champlain, Vermont, and twenty-four small fish from Saint Joseph River, Michigan, both shipments being of the small-mouth variety; the former were planted in Napa Creek, the latter (twelve survivors), in Alameda Creek. A second shipment of twenty-two mature fish was brought out by Dr. Stone in 1879, and planted in Crystal Springs Reservoir, in San Mateo County, where they increased rapidly; hundreds of the progeny were consigned to various waters in the state. The United States Commission, in 1891, deposited nearly 2,000 yearling large-mouth bass in Lake Cuyamaca, in San Diego County, and 620 in the Feather River, near Gridley. In June, 1895, at the request of the California Fish Commission, the United States Commission delivered 2,500 large-mouth bass fry to the agents of the state commission. These fry were placed in the ponds at the Sisson hatchery, where they thrived, and whence the species was distributed throughout the state, wherever suitable waters were to be found. In the same month, fifty fish were put in each of the following California waters: Buena Vista Lake, near Bakersfield; reservoir near San Diego; and Elsinore Lake, near Elsinore. Agents of the Fish Commission distribute a large number of bass each season from the overflowed districts, where they are seined and deposited in public waters. Both species of the bass are highly esteemed as food and game fishes, and are a great acquisition to the fish life of California.



LARGE-MOUTH BLACK BASS—*Micropterus salmoides.*

Fig. 1. Large-mouthed black bass, first introduced into the waters of California in 1891, when 2,000 yearlings were placed in Lake Cuyamaca, in San Diego County, and 620 in the Feather River near Gridley, Butte County. In 1895 another shipment was received from the United States Fish Commission and placed in ponds at the Sisson Hatchery, from which place they were distributed to all parts of the state.

10. A shipment of eighteen full-grown wall-eyed or glass-eyed pike, or pike perch (*Stizostedion vitreum*) was brought to California in 1874 from the Missisquoi River, Vermont, and sixteen were planted in the Sacramento River, near Sacramento City; but they did not multiply.

11. The tautog (*Tautoga onitis*) was first brought to California by Dr. Livingston Stone in 1874, and a second lot in 1897. Both shipments were deposited in San Francisco Bay; but they consisted of only a few hundred fish each and no results were obtained.

12. Four full-grown rock bass (*Ambloplites rupestris*) of the six obtained from the Missisquoi River, Vermont, were brought to California by Dr. Livingston Stone, in 1874, and deposited in Napa Creek, a tributary of San Pablo Bay, on June 12th. No known results have attended the planting of this fish.

13. In 1877, the California commission exchanged salmon and trout eggs with the Hawaiian Government for a shipment of 100 fish, known as the awa (*Chanos cyprinella*); they were planted in a small stream at Bridgeport, in Solano County. There is no record of any of this species having survived.

14. The eggs of the landlocked salmon (*Salmo salar sebago*) were first brought to California in 1878. Between that date and 1895 at least five shipments were received from the federal commission, totaling about 135,000 eggs. These were hatched at the San Leandro and the Shebley hatcheries, and the fry distributed in the cold lakes of the high Sierras, and in the lakes and streams of the Truckee Basin. A few fish have been taken that had reached maturity, but the species has not increased in numbers. The fish have been held in the hatchery ponds at Sisson for a time and have thrived, but no particular effort has been made to propagate them. A shipment of the eggs was hatched at Sisson hatchery and another lot at Bear Valley hatchery, in the early nineties.

15. One of the most important and successful importations of fish into California waters was made when the striped bass (*Roccus lineatus*) was introduced in 1879. The introduction of this valuable food fish was first suggested by S. R. Throckmorton, president of the California Fish Commission, in a letter to Professor Spencer F. Baird, then United States Commissioner of Fisheries. As a result of this suggestion, Dr. Livingston Stone was instructed to transport a shipment of striped bass to California. Accordingly, he collected from the Navesink River, in New Jersey, 132 fish, ranging from one and one-half to five inches in length, and thirty medium-sized fish. Twenty-five of these died en route, but the remainder, about 135, were deposited in the Straits of Carquinez, at Martinez. Individuals from the first lot were caught in the lower waters of the bay within a year from the time that they were planted, and a number were caught occasionally for several years afterward; but the commission decided to have a second shipment made from the East, as it was not certain that the fish were increasing. Accordingly, in June, 1882, Mr. J. G. Woodbury was sent East by the California Fish Commission to procure another shipment. He collected 450 fish five to nine inches long from the Shrewsbury River, New Jersey, and in the latter part of July arrived with a little over 300 of the fish in good condition; they were planted in Suisun Bay, at Army Point,

near Suisun. Considering the small number of fish introduced and their remarkable increase in a few years, the result obtained from the introduction of the striped bass into California is one of the greatest feats of acclimatization of new species of fish in the history of fish-culture. In 1889, hundreds of them, weighing from one-half to a pound each, were being caught and sold in the San Francisco markets. From 1889 to 1892, the number caught had increased 250 per cent; such quantities were being taken in 1889, it was feared the fish would be exterminated before they had come to maturity and had a chance to reproduce; so the Supervisors of San Francisco County, at the request of the Board of Fish Commissioners, passed an ordinance prohibiting the sale of striped bass under eight pounds in weight. A state law was afterward passed making it unlawful to take bass under one pound; and later this was changed to the present limit of three pounds. It is now also unlawful to ship striped bass from the state. The striped bass is one of the finest food and game fishes in the United States; and if the California Fish Commission had not succeeded in acclimatizing any other variety of fish, the value of the striped bass alone would more than repay the people for all the money expended in introducing other species. Over two million pounds of striped bass have been marketed in one season in San Francisco. This does not include the amounts sold in other places.

16. In 1891, 3,000 yearling yellow or ringed perch (*Perca flavescens*) were deposited by the United States Commission in the Feather River, and 3,980 in Lake Cuyamaca, in San Diego County, where they increased rapidly. A few were taken to Sisson hatchery and placed in the rearing ponds, in 1895. They remained healthy and made a good growth, but owing to lack of pond room no efforts were made to propagate them to any extent. Occasionally a few have been taken from the Feather River and from some of the sloughs in that region, but as the species has not been generally distributed, the results of the planting have not been fully determined.

17. Four hundred yearling warmouth bass (*Chænobryttus gulosus*) from Quincy, Illinois, were planted by the United States Commission in Lake Cuyamaca, near San Diego, in 1891. In the same year, 100 yearlings were deposited in Feather River, near Gridley, Butte County; and in 1895, twelve fish were delivered at Sisson hatchery, but they were not in good condition. Six of them died shortly after they were placed in the ponds; the remaining six survived until the following spring, but food conditions not being suitable, they did not thrive and died before spawning.

18. The crappie (*Pomoxis annularis*) and the strawberry or calico bass (*Pomoxis sparoides*) were introduced in the early nineties, but were not widely distributed. In 1891, 285 yearlings were deposited in Lake Cuyamaca, near San Diego, and in 1895, 50,000 fry were sent to the Sisson hatchery; but none of them lived.

19. In 1891, a shipment of 400 yearling pike (*Lucius lucius*) was made to Lake Cuyamaca, near San Diego, and another 100 were placed in the Feather River, in Butte County. The fish planted in Lake Cuyamaca increased for a time, but those in the Feather River have not multiplied. In 1895, six pike were delivered at Sisson hatchery; they thrived in the ponds for a year, when they were placed in an aquarium

at the Mechanics Fair, in San Francisco, and died before the fair was over. It is well that they died and that those planted in the Feather River did not survive; for the species is too predatory to plant among our valuable fishes.

20. In May, 1893, the New York commission gave 100,000 muskellunge fry (*Lucius masquinongy*) from Chautauqua Lake to the California Fish Commission. The United States Bureau of Fisheries transported the fish free of charge as far as Ogden, from which place the consignment was under the auspices of the California commission, the Spring Valley Water Company paying half the cost of transportation from Ogden to San Francisco. The fish were received in good condition, and 93,000 were placed in Lake Merced, near San Francisco, to destroy the carp in the lake, as they were keeping it roily and made the water almost unfit for use, but they did not survive; and as in the case of the pike, it is probably as well that they did not, for while they are a game fish, they are too predaceous to place among our more valuable fishes. These fish were put in private waters with the understanding that the commission might take such fish for distribution or breeding purposes as might be desirable.

21. The lake trout (*Salvelinus namaycush*), known also as the salmon or Mackinaw trout, was first brought to California in 1894. The shipment of 100,000 eggs was hatched at the Sisson hatchery, with a loss of only 7 per cent. Sixty-five thousand of the fry were planted in Lake Tahoe in May, 1865, the remainder being held in the ponds at the Sisson station and shipped the following season. Several other lots were hatched at Sisson, and the fry deposited in the lakes of the Truckee Basin. A number of these fish are taken each season from the waters that have been stocked, where they have thrived to a considerable extent, but not as well as was expected. This trout is abundant in the waters of lakes Superior, Huron, and Michigan, and should attain a large size in Lake Tahoe, as the species is adapted to cold, clear, deep lakes.

22. In February, 1894, 20,000 eggs of the Loch Leven or Scotch lake trout (*Salmo trutta levenensis*) were sent to the California commission from the stock ponds of the United States Government at Northville, Michigan. They were hatched at Sisson hatchery, and the fry deposited in the hatchery ponds, where they thrived. The stock has been retained in the Sisson hatchery ponds ever since, where they have been propagated successfully, and thousands of the fry are shipped each year for distribution in the public waters of the state.

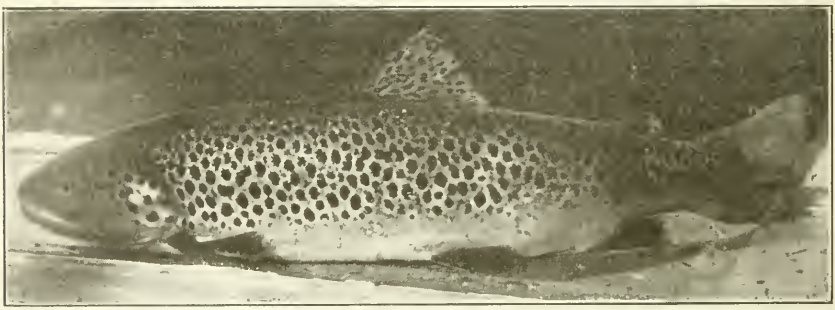


Fig. 2. Loch Leven trout. The original stock of Loch Leven trout was received in 1894, when 20,000 eggs were received from the United States Fish Commission Hatchery at Northville, Michigan. Thousands of Loch Leven trout fry are now shipped out from the Sisson Hatchery each year.

The Loch Leven and the German brown trout are closely allied and appear to be but different varieties of the same species. They are somewhat different in their habits, but do equally well in the clear, cold lakes and streams of the Sierras, as well as in the region around Mount Shasta. The two varieties have been crossed at the Sisson hatchery, and have produced a strong, gamy fish.

23. In 1895, 135,000 Von Behr or German brown trout eggs (*Salmo fario*) were hatched at the Sisson hatchery. Several thousand fry were placed in the ponds to be raised for breeders, and the remainder were distributed in a number of the lakes and streams of the high Sierras. Previous to this the federal government had made several plants in the state.

24. Twelve yearling white bass (*Roccus chrysops*) were received at Sisson hatchery from Quiney, Illinois, in June, 1895. They were not in good condition and seven of them died shortly after their arrival; the others died the following fall. This introductory shipment of white bass is the only one of which there is any record.

25. Small plants of the green sunfish (*Lepomis cyanellus*) and the bluegill or blue bream have been made in California. In 1895, twelve yearlings were delivered to the Sisson hatchery; eighteen were put in Elsinore Lake, and eighteen in the Bolsa Chico River. A few were accidentally introduced with other fish into Lake Cuyamaca, near San Diego, in 1891. Wherever conditions are favorable, these fish have thrived.

26. The California Fish Commission has endeavored to introduce the Montana grayling (*Thymallus montanus*) into the waters of California, but so far without any known results. The eggs are very delicate and the fry hard to raise. In 1904, 100,000 eggs, from Bozeman, Montana, were received at the Sisson hatchery in good condition. Seven thousand of the fry were placed in a pond that was thought suitable for them; they thrived for eighteen months, then became diseased and died off, until only 600 were left; these were placed in a pond where they were in an entirely wild state and could subsist on natural food. These fish and a few that were saved from a lot received the following year grew up together and promised to furnish some eggs for propagation, but owing to the accidental bursting of the pond wall, the fish escaped into one of the tributaries of the Sacramento River, just as they were reaching maturity. Several thousand of the fry were distributed from the second lot of eggs that were received, into waters that, from descriptions given of the fishes' habits, appeared to be ideal, but no results have been noted thus far. The grayling is considered by some anglers to be the most beautiful and graceful of American fresh-water fishes. They rise to the artificial fly more quietly than do the trout, but make a good fight and are an excellent table fish.

The last lot of fresh-water fishes received in California from the United States Bureau of Fisheries was in November, 1908. The fish were shipped from Meredosia, Illinois, and consisted of crappie (*Pomoxis annularis*), blue-gilled sunfish or bream (*Lepomis pallidus*), and yellow perch (*Perca flavescens*). They were distributed as follows:

Four cans of crappie and sunfish in Honey Lake, Lassen County; a number of yellow perch and crappies in Vera Lake, Nevada County;

sunfish and yellow perch in lakes in Placer County, and in sloughs of the Feather and Sacramento rivers; some of all three varieties near Stockton, and in Clear Lake, Lake County; perch and sunfish in Kings River and San Joaquin River, and sunfish and yellow perch in Kern River and Buena Vista Lake. Some of the fish were planted in Russell's Lake, Ventura County, and in suitable waters in Los Angeles, Riverside, and Orange counties. Reports from several of these places have been received and indicate that the fish are thriving and increasing.

No effort has ever been made by the commission to introduce eastern oysters, but it is stated that they were first brought into California in or about 1870, by Mr. A. Booth of Chicago, and it is recorded that the first shipment, consisting of three carloads of large oysters, so overstocked the market that in order to avoid loss the consignee had to plant in San Francisco Bay all the stock not promptly disposed of. The enforced planting resulted favorably, and it became the custom to annually ship one-year and two-year seeds to be planted on the grounds in the southern part of San Francisco Bay, where they remained for two and three years, or until they attained a suitable size for marketing. There have been various reports of wild eastern oysters taken at different points in the bay, and Mr. Chas. H. Townsend, in the Report of the United States Fish Commission for 1889–91, says: "It is possible that during the long time eastern oysters have been kept in the bay they have become in a measure acclimated, and that there is a constantly increasing tendency to propagate—that is, the progeny of oysters grown here become hardier with each generation and better adapted to the colder but more equable waters." Full accounts of the early eastern oyster industry in San Francisco Bay are given in Mr. Townsend's article and in an article by Captain J. W. Collins, in the Report of the United States Fish Commission for 1888.

From 1899 to 1908 the oyster industry decreased gradually, all of the oysters taken in the latter year being taken from private beds, and used for market purposes only. All seed oysters planted that year were shipped from eastern beds.

The appearance of the soft-shell clam in San Francisco Bay was first noted in 1874. The spawn is supposed to have been accidentally introduced with the carloads of eastern oysters planted in the vicinity of San Francisco. They soon covered the mud flats surrounding San Francisco Bay, and were taken in great numbers.

THE FISH DISTRIBUTION OF 1916.

By G. H. Lambson, Superintendent Sisson Hatchery.

When the last carload of trout left the hatchery we gave a sigh of relief to think that the arduous work of the past four months had been brought to a successful conclusion, and that so many fine trout had been planted in the public waters of the state, where all could enjoy the pleasure and profit of catching them. There were the gamy steelhead, the beautiful eastern brook trout, the black-spotted trout from the cold waters of Tahoe, the Loch Leven trout whose ancestors came from Scotland, and last but best our own native favorite—the rainbow. They were fine, lusty fellows, and all were sent forth to the waters best suited to each kind, to add to the health and pleasure of our people.

Our thoughts turned to the many anglers who, by purchasing licenses, supported the hatcheries and made the great work possible. But they have their reward, for any one who catches but two pounds of trout during the season is repaid in a medium as valuable as gold, while he who catches as much as twenty pounds receives a thousandfold return. But there is a greater value, more subtile, but none the less real, that of the health and pleasure of the people. On any summer night along a hundred streams and lakes may be seen gleaming the campfires of the happy anglers, camping out and breathing the health-laden air of wood and stream. The worried business man, the weary laborer, the professional man, all are there, often, with their entire families, and all reaping a greater profit than could be had from any other investment, for health and pleasure are the dividends.

Our state is famous for its beautiful women and keen, alert men of business, and if the cause could be sifted into its component parts I wonder how much would be found to be due to our well-stocked streams? Surely it would be very large.

The favorite prescription of the physician is to "take a rest, go out into the country and live next to nature," and, I would add, come back with renewed vigor for the strenuous life of today. But the physician's advice is disregarded unless there is some incentive to urge them on, and this is supplied by the fine fishing in our streams and lakes which are stocked annually from the hatcheries.

The commercial side has also received close attention and millions of salmon have been planted in the Sacramento and Klamath rivers. They were not the small fish of the earlier season, but fine, big, well-fed yearlings from three to six inches long, fish that are fully able to cope with the dangers that beset them on their journey to the sea, and which will return in from three to six years as mature salmon and add to the wealth of the state, to the delight of the angler, and to furnish a delicious food to those who must, perforce, procure their fish from the market. In our twenty years' experience in salmon work we have never seen planted such large and healthy fish as those distributed this season.

In the distribution from the Sisson hatchery there were forty-three carloads of the various kinds of trout, each averaging 100 cans, and

many thousands were sent out by messengers. There were fifteen carloads of salmon planted in the Klamath River, while the Sacramento was stocked direct from the hatchery by wagon. We can not conceive of a better investment, or one that benefits a greater number of people than the hatcheries. Every class and family, the angler, the commercial fisherman, the dealer or packer, all share in the dividends which are declared daily. Truly our state is a favored one.

SCIENTIFIC NATURE STUDY IN THE PUBLIC SCHOOLS.

By Georgie V. Miller.

We are apt to think of the law of supply and demand as an important and everlasting plan which no amount of neglect will spoil. It is not usually until the loss caused by waste or mismanagement directly affects us that we begin to consider a way to prevent a crisis.

Forests, for example, a few years ago were found to be deteriorating so fast that the government and different states took up the matter of their conservation with added seriousness of purpose. Courses of forestry were established in the various colleges, and conditions partook of a new aspect.

That was the medieval step in forest conservation through education. The modernist perceives cooperation through enlightenment of the people at large—not of the few whom the university courses directly reach. "Teach the children of the public schools the common names and uses of the trees," said Professor Tower of the Department of Forestry, University of Maine. "This will create in them a desire for further knowledge of the subject, and give them, not too late, a reason for the folly of waste."

Don Carlos Ellis, in charge of educational work for the United States Forest Service, made an everlasting impression upon the school children of San Francisco who were so fortunate as to hear his lectures and see their accompanying motion pictures, during the recent exposition. The United States Forest Service is placing emphasis on the educational method of forest conservation.

A campaign is on for the conservation of wild life through education. The courses are so well conducted and attended, and the names of those in charge so familiar, that I need not dwell upon this phase of the work. Be it sufficient to say, however, of wild life as a study, that its really systematic introduction occurs, generally speaking, in the university. Nearly all the work in the grades is merely incidental. A hint to us that the children will be sought in case of a doubtful situation, is the recent urgent appeal to them to save all newspapers against a possible paper famine. Then give the children something substantial in nature study. Beside its scientific and economic lessons

the work has its moral and artistic values, the habit of killing being reduced to a minimum when students have learned to thoroughly enjoy animals and birds alive through knowing them. The study will prove pleasurable to them and profitable to everyone.

A country or suburban teacher has not far to look for available material. I found the boys knew the local birds, and were desirous of studying their habits more closely. Next came birds of exceptional interest from other regions, for nature study should no more be confined to one small corner of the world than is geography.

It was not until last year that I ventured to introduce bird study in a city school. Leo Wiley, collector of specimens, had sent me a number of bird skins as an aid. Several lessons had been given after my usual method of procedure, when I promised to show the class on the following day the skin of a California roadrunner.

Unusual excitement followed this announcement. The majority of the boys thought it a new kind of automobile. How could I show the skin of a machine? But the girls were sure it was a snake, and shivered becomingly. Not one had ever seen a roadrunner. They examined the stiff eyelashes, speculated upon what the bird must eat, marveled at the length of his legs, now fully understanding why the Spanish called him *"correo del camino,"* which our Anglo-Saxon pioneers later translated to roadrunner.

Each of the specimens was shown many times, not only to the members of my own class, but to others. The boys had spread the news, and so extravagantly that many believed my supply equal to a museum's. I was gratified, even though enthusiasm had got the better of veracity in several instances. I felt like the Pied Piper, only that in our case a way to new observations had been opened to the children without the closing of a mountain, behind which lay the joys of childhood.

That those boys will look and listen when afforded an opportunity I have no doubt. During vacation a newsboy whose name was unknown to me, tucked a copy of the "Bulletin" under my arm. He smiled sweetly, and I was about to pay him when he shook his head and rushed after a prospective customer. On his way I heard him reply to a companion, "No, not mine—the big guys' teacher; the one that knows everything about birds."

So many teachers have expressed the desire for something definite as an aid to the introduction and presentation of the subject of birds, that I submit the following outline. This I have used successfully, in more or less the same form, a number of years. There are innumerable

reference books, among them Mrs. Bailey's "Handbook of Birds of the Western United States," than which none is more complete at the present time.

DETAILED OUTLINE FOR THE STUDY OF ANY BIRD.

I. Location.
  1. State or portion of state.
  2. Woods or open.
  3. Swampy or dry section.

II. Description.
  1. Size.
    (1) Compared with robin.
    (2) Compared with English sparrow.
  2. Shape.
    (1) Body.
      a. Long and slender.
      b. Short and stocky.
    (2) Head.
      a. High or crested.
      b. Small and nearly horizontal with body.
    (3) Bill.
      a. Large and strong.
      b. Short and stocky.
    (4) Tail.
      a. Long.
      b. Short.
      c. Notched.
      d. Forked.
      e. Rounded.
    (5) Wings.
      a. Long.
      b. Short.
    (6) Feet.
      a. Large and strong.
      b. Small and weak.
  3. Color.
    (1) Upper parts.
    (2) Lower parts.
    (3) Special markings.
      a. Chin.
      b. Eye.
      c. Rump.
      d. Tip of tail.
      e. Under tail parts.
      f. Outer tail feathers.
      g. Wings or wing bars.
      h. Belly.
      i. Breast.
  4. Movements.
    (1) On the ground.
    (2) In flight.
    (3) On perch.

III. Family.
  1. Sparrow-finch.
  2. Swallow.
  3. Flycatcher.
  4. Goatsucker, swift, hummingbird.
  5. Lark.
  6. Warbler.
  7. Thrush.
  8. Waxwing.
  9. Tanager.
  10. Wren, thrasher.
  11. Vireo.
  12. Kinglet.
  13. Oriole, blackbird.
  14. Crow, jay, magpie.
  15. Kingfisher.
  16. Nuthatch.
  17. Woodpecker.
  18. Shrike.
  19. Owl.
  20. Hawk, eagle.
  21. Vulture.
  22. Grouse, partridge, quail.
  23. Snipe.
  24. Plover.
  25. Roadrunner.

IV. Food.
  1. Vegetable.
  2. Animal.
  3. Manner of obtaining—
    (1) While in flight.
    (2) Flying from perch.
    (3) From trees or insects in trees.
    (4) From the ground.

V. Song or call.

VI. Residence.
  1. Summer.
  2. Winter.
  3. Permanent.
  4. Transient.

VII. Migration.
  1. Time.
  2. Place.

VIII. Nesting.
  1. Time.
  2. Place.
  3. Kind of nest.
  4. Eggs.
    (1) Number.
    (2) Color.
    (3) Size.
  5. Young birds.

CALIFORNIA FISH AND GAME

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All material for publication should be sent to **H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.**

January 20, 1917.

"The United States is not yet ours in the proudest sense, and can not be until we are doing all that can be done to give to all its people and to the world the full expression of its highest intelligence applied alike to its resources and to the life of the people." —Franklin K. Lane.

WILL YOU DO YOUR SHARE?

Please read again the above quotation by Franklin K. Lane, Secretary of the Interior, and emphasize the words "full expression" and "resources." What is California's "full expression of its highest intelligence applied to its fish and game resources?" Is it the still noticeable disregard for protective laws? The noticeable waste of a valuable food supply? The neglect of valuable species reduced to the danger point? The tolerance of the game hog? No! The full expression of California's highest intelligence is more than this. With the convening of the legislature this month there is opened another chance to better game conditions and conserve for the future the wild life resources of the state. The goal suggested above can only be reached when all the people of the state take an interest in fish and game and do their share toward its realization. See that your representatives believe in "conservation" and back up their belief with action. Do your share!

WHAT DO YOU WISH TO KNOW ABOUT FISH AND GAME?

The Bureau of Education, Publicity and Research of the California Fish and Game Commission should be made a clearing house for information on fish and game. Are you not anxious to know the truth regarding the life and habits of some game species? The number of false stories which are current is appalling. Settle your disputes by writing the bureau. If we are unable to answer your question we will refer it to someone who can answer it. The reply will be sent you by mail or will appear in the columns of CALIFORNIA FISH AND GAME, at your pleasure.

CARL WESTERFELD.

NEW EXECUTIVE OFFICER.

At a called meeting of the State Fish and Game Commission, held at Sacramento on December 8, 1916, Carl Westerfeld, fish and game commissioner since November, 1911, resigned as commissioner and Mr. Edward L. Bosqui of San Francisco was appointed by Governor Johnson to fill the vacancy. The commission then appointed Mr. Westerfeld as executive officer to succeed Ernest Schaeffle, who resigned in September, 1916. All who know Mr. Westerfeld are congratulating the commission on its choice and the whole state on its good fortune in obtaining the services of so capable a man.

Carl Westerfeld was born in San Francisco and has lived in that city all of his life, with the exception of the few years spent at college. He took his A.B. at Yale University in 1893, and in 1896

graduated from Hastings College of Law. He was admitted to the bar and has since made a name for himself in his profession. His interest in fish and game led to his appointment as commissioner, and to his election as president of the Pacific Fisheries Society in 1914. For the past five years Mr. Westerfeld, although having many personal interests, has given a great deal of time and attention to the work of the Fish and Game Commission, and consequently is in close touch with its activities and plans.

THE BIENNIAL REPORT.

Clothed in an attractive colored cover showing a mountain lion in wait for deer, the Twenty-fourth Biennial Report of the Fish and Game Commission is off the press and ready for distribution. The report covers the period from July 1, 1914, to June 30, 1916, and gives in detail the work accomplished by the commission.

The main body of the report, which is a summary of the activities and accomplishments of the commission, is followed by departmental and district reports and by an appendix giving a roster of employees, an inventory of state property, the distribution of fish by counties, the distribution of game birds, and full statistics on lion bounties paid, seizures of fish and game and illegally-used fishing apparatus, violations of fish and game laws, hunters and anglers license sales, and receipts and disbursements. Nearly one hundred halftones illustrate the report. Conspicuous among these illustrations are pictures showing the work of the deputy, a series showing how fish are transported from the hatchery to the stream, seining fish from overflowed districts in the San Joaquin Valley, feeding quail during severe winter weather and various fishways, screens and hatchery buildings.

The report clearly shows that the past biennial period has been one of marked advance in the protection and preservation of wild life, the propagation of fish, the stocking of streams, the construction of fish ladders and screens, and above all, in the accumulation of data on fish and game and the development of a public sentiment favoring wild life conservation. All of the duties of the commission, as above outlined, have been performed as fully and faithfully as the financial and other resources have allowed.

More arrests have been made and more convictions obtained in this than in any previous biennial period.

Educational and publicity work has been largely augmented and one department gives almost its entire time to work of this kind.

The game refuges of the state have been enlarged by the addition of 782,998 acres of national forest lands, which were set aside by the last legislature.

The new and amended fish and game laws of the 1915 legislature have proved to be important conservation measures. Noteworthy in this legislation was the elimination of "bull hunting," the changing of the laws to accord with the Federal Migratory Bird Law and the shortening of seasons and lowering of bag limits.

Large numbers of deer and quail were saved from starvation during the severe winter weather of 1916.

Through the payment of 162 lion bounties in 1915 and of 111 during the first six months of 1916, thousands of deer have been saved from death at the hands of these predators.

Sixty-eight assistants or deputies have carried on active patrol duty, and although some of them patrol areas greater than the state of Vermont, yet wild life has been safeguarded to a remarkable degree.

Sufficient fish were liberated during the year 1915 to furnish every resident of the state with sixteen fish. The hatcheries and egg collecting stations have been operated to their full capacity and the streams of the state are already showing the result.

The department of commercial fisheries, established in 1914, has accumulated important data on the fisheries of the state and has been instrumental in aiding in the development of certain neglected fishery resources.

The attainments recorded in the twenty-fourth Biennial Report indicate that much has been accomplished during the period from July 1, 1914, to June 30, 1916, towards the conservation of fish and game resources in the state of California and that the people of the state may justly be proud of the board which administers these resources. Certainly no other fish and game commission has accomplished more in the same period of time.

HOW LONG?

How long! How long, will the people of the state of California allow officers in state employ to be murdered by aliens, many of whom go unpunished?

Several years ago Bert Blanchard, a deputy of the Fish and Game Commission, was found dead in the hills of Contra Costa County. He had been shot by some hunter, probably an alien. Some years after Ernest Reynaud, another deputy of the commission, was killed by Italian fishermen near Greenbrae. Mr. Reynaud, along with M. S. Clark, had arrested two Italian fishermen. When a third Italian was taken into the boat as interpreter a fight followed, with the result that Mr. Reynaud was killed and Mr. Clark, being thrown out of the boat, only succeeded in saving his life by swimming to shore. Fortunately the man responsible was apprehended and sent to San Quentin for life. Soon after Deputy Frank P. Cady of Susanville was shot in the leg by an Indian violator. In the discharge of his duties Deputy George J. Rodolph was shot by two market hunters near Los Banos. The guilty man was acquitted by a jury and his companion was discharged on a preliminary examination.

As we go to press word comes that Deputies Ray Heacock and Richard Squire were murdered by aliens on Bouldin Island near Terminus, San Joaquin County. Deputy Squire was found in the boat, shot through the head and the boat and his clothing riddled with bullets. The body of Deputy Heacock has not been found at the date of writing. Earlier the same night two white fishermen, at the point of revolvers, were told to move on by four Italian fishermen. The same men later killed these two deputies while they were in the discharge of their duties.

Pennsylvania's answer to outrages of this kind was a law prohibiting the carrying of firearms by aliens. At the time this law was passed it was pointed out that a very large percentage of all the murders in Pennsylvania were committed by aliens. The measure was, therefore, a measure not only to more largely protect fish and game, but to protect human life. Will California take the same steps to stop crimes of this sort?

THE CLOSED SEASON.

The coming few months are especially set aside as a closed season when no hunting whatever is allowed. The most fundamental law of conservation is that animals must be protected during the breeding season. If the parents are killed at this time the young are left to starve. Animals during the breeding season become remarkably tame and the killing of them at this time is not sport but wanton murder. Do your share to protect all wild life on its breeding grounds and see that all your friends and neighbors do likewise.

BOY SCOUT COOPERATION.

Believing that many of our readers will be interested in seeing what boy scouts in this state are doing for the conservation of wild life we are instituting a department in which the scouts will have a chance to demonstrate their work. Only a beginning has been made in this cooperative work and we may expect to see a steady improvement in the output of the boys.

The Fish and Game Commission is endeavoring to do its share by furnishing free stereopticon lectures to the different troops.

HEAVY PENALTY IMPOSED FOR SMUGGLING DUCKS.

A. L. Mason, of Los Banos, was arrested and fined $500 and sentenced to 150 days imprisonment for attempting to smuggle ducks to the San Francisco markets. Mason had 457 ducks in a small machine, and was headed for San Francisco, when by merest chance he was apprehended. He appealed to Night Watchman Michael Collins of Redwood City to help him fix a blow-out, and in the search for a new inner tube the ducks were uncovered. The sentence, imposed by Justice of the Peace George Seely of Redwood City, is the heaviest on record for an offense of this kind.

THE FOOD OF DUCKS IN CALIFORNIA.

If increase of food supply means increased numbers of a game species, it is reasonable to believe that were it possible to furnish artificially additional food for waterfowl, greater numbers would not only be attracted to this state, but many would doubtless remain and breed. The

Fig. 3. Large Loch Leven trout taken in the Owens River by Guy H. Dusenbery of Bishop, Inyo County. Photograph by J. H. Von Blon.

The large Loch Leven trout shown above was taken in the Owens River, about twelve miles north of Bishop, Inyo County, by Mr. Guy H. Dusenbery in November, 1916. A huge hook—probably an Indian's—was found imbedded in its jaw. Probably as a result of this hook the fish was of light weight considering its size. In good condition it would probably have weighed eight pounds. The size of the fish is remarkable in that Loch Leven trout planted by the Fish and Game Commission in the Owens River but seven years ago. The weight of this fish, therefore, indicates a growth of approximately a pound a year.

inroads on the natural food supply made by reclamation can be counterbalanced by artificial planting of those plants furnishing food for waterfowl. More and more interest is being taken in this conservation measure.

To the man or the club seeking information on the proper food plants to grow we recommend the following bulletins:

Three important wild-duck foods, U. S. Dept. Agric. Bur. Biol. Surv., Circ. 81, pp. 1–19.

Five important wild-duck foods, U. S. Dept. Agric. Bull. 58, pp. 1–19.

Eleven important wild-duck foods, U. S. Dept. Agric. Bull. 205, pp. 1–26.

All of these bulletins deal more largely with Eastern conditions, however, and nothing but experiment will demonstrate the value of many of the species for our conditions. In order that more detailed information be available for Californians, the Bureau of Education, Publicity and Research of the Fish and Game Commission has begun an investigation into the food of wild ducks. Hundreds of stomachs have been collected and the contents of these are being analyzed and the results tabulated. Already nearly a hundred stomachs have been examined. When the investigation is completed, evidence as to the seeds, roots and bulbs most often fed upon by the different species of wild ducks will be at hand. It will then be possible to make better recommendations as to the best native food plants to grow in order to attract waterfowl.

STATE FAIR EXHIBIT.

The Fish and Game Commission maintained an extensive and interesting exhibit at the California State Fair, held at Sacramento during the early part of September. Owing to the greatly increased number of exhibitors at this year's fair, the space allotted the commission's exhibit was not as much as desired, but, fortunately, was so located as to be directly in front of the main entrance and in the path of the thousands of visitors, both when entering and leaving the grounds.

A unique octagonal pavilion, forty by forty feet, was constructed of fish nets that had been confiscated from fishermen using them in an illegal manner. An additional lot of confiscated nets, making a pile twelve feet high by twenty feet wide, was shown on the outside of the pavilion.

Large aquaria showing splendid adult specimens of various species of trout, also troughs showing the propagation of trout from the egg to the time when the young fish are liberated, attracted much attention.

All of the species of trout to be found in this state were shown in jars, also some twenty-five species of freshwater fish taken from the San Joaquin and Sacramento delta districts, together with photographs showing deputies of the commission engaged in seining and distributing these fish. Portable pens containing pheasants, quail and deer from the State Game Farm at Hayward, together with mounted specimens of birds and mammals, did much to complete the attractiveness of the exhibit.

There were photographs of the fish hatcheries, the fish distribution car, and a series of splendid pictures showing the work done by the commission in collecting and distributing golden trout to the almost inaccessible lakes and streams of the high Sierras by means of mule pack train. Fish-culturists of the commission were in attendance to explain the artificial method of propagation. The thousands of people who viewed the exhibits went away with a better understanding of the splendid work that is being accomplished by the California Fish and Game Commission.

PRACTICAL EDUCATION.

The Irving School of Riverside, Riverside County, has received the honor of being listed by the New York Audubon Society as one of the ten schools in the United States "standing highest in the contest relating to the identification of local and migratory birds." The fifth grade of the school sent in a list of eighty-one species of birds observed in the near vicinity. Hundreds of schools in the United States entered the contest.

To increase the appreciation of California's many songbirds, the San Diego County Board of Education requested all grades and high schools to give particular study to birds from November 6 to 17, as preparation for a contest based on compositions written on the following

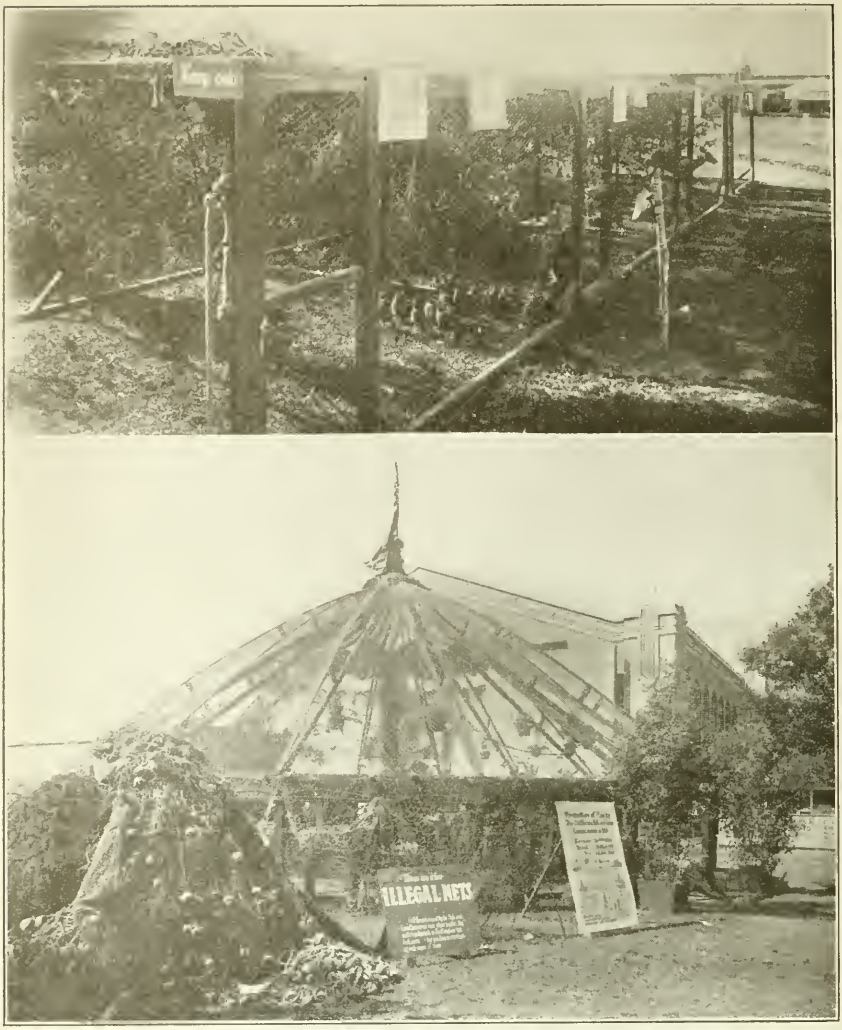


Fig. 4. The Fish and Game Commission exhibit at the State Fair, September, 1916.

subjects: "What I observed in one week," "Bird nests," "Mountain birds," "Our most useful songsters," "Sea birds," and any subject requiring keen observation. The papers were graded on quality and the length of each was left to the discretion of the teachers.

The exposition company offered 100 free admissions for the best 100 papers, and 15 medals for the best 15 papers. Papers were graded by November 14 and the best compositions chosen from every grade and one from every class in the high school. The best products of the art department, showing birds, were exhibited at the exposition, and remained through Bird House Day celebration, held December 15. The commercial departments exhibited designs, the sewing classes exhibited bird embroideries and the music classes sang bird songs.

In our opinion, studies of this kind are of far more value than many of the prescribed courses of study. A child that is "taught to read a roadside as well as to read a book" is worth more to himself and more to the community in which he lives.

THE TREATY WITH CANADA.

Conservationists the country over are rejoicing because of the passage of the Canadian Treaty, which supplements the Federal Migratory Bird Law. The following is a summary of the main provisions:

1. That no bird important to agriculture because of insect-destroying proclivities shall be shot at any time.
2. That no open season on any species of game birds shall extend for a longer period than three and one-half months.
3. That both countries shall so restrict open seasons on game birds as to prevent their being taken during the breeding season.

4. That there shall be no shipment from one country to the other of birds which are taken contrary to law.

Fig. 5. Deputies of the Fish and Game Commission at work in the marshes of the San Joaquin Valley. From left to right are deputies Smalley, Brownlow, Smith, Maloney, Kimball, Squires, Hoen and Matthews. Photograph by J. E. Newsome.

The treaty is to remain in force for fifteen years and will continue in force beyond that time, provided the contracting powers do not give twelve months notice of a wish to terminate it.

MIGRATION RECORDS.

Many people in Eastern states obtain considerable pleasure by making notes regarding the arrival and departure of birds. Few people in California systematically record arrivals and departures and consequently miss the elation as evidenced in a card recently received from one of our readers.

"Winter Resorts.

"SOCIAL ITEMS.

"Mr. Robin has arrived at the Lastreto Woods, Atherton, and was very busy investigating conditions and making arrangements for Mrs. Robin and his numerous family preparatory to their customary winter sojourn. His rotund form was visible on Tuesday morning, the 7th inst."

Probably few others in the vicinity of Atherton, San Mateo County, even noticed that the western robin had returned for his winter stay. Ignorance regarding bird life in California is great even among people of leisure. We trust that as years go by a keener interest will be taken in our bird life and that instead of receiving a single notice of the arrival of a winter visitant, hundreds of cards will furnish data to show the southward progress of the different species from day to day. If any of our readers are looking for a stimulating hobby let them turn their attention to the recording of the arrival and departure of migratory birds.

GOAT ISLAND BECOMES NATIONAL GAME PRESERVE.

The Fish and Game Commission has for several years past liberated pheasants and quail on Goat Island in San Francisco Bay. Both pheasants and quail have been doing well. Due to the efforts of Captain Andrews, formerly commandant of the Naval Training Station situated on the island, who took an active interest in these birds, the island has been declared a federal game preserve.

The executive order, signed by President Woodrow Wilson, is as follows:

It is hereby ordered that Goat Island, containing about one hundred and forty-one acres of land, situated in San Francisco Bay, approximately midway between the cities of San Francisco and Oakland, Cal., shown upon Coast Survey Chart No. 5531, and as segregated by the broken line upon the diagram hereto attached and made a part of this order, is hereby reserved and set apart for the use of the Department of Agriculture as a preserve and breeding ground for native birds, subject, however, to the use of the island for naval, military and lighthouse purposes in conformity to requirements of executive orders heretofore issued.

It is unlawful for any person to hunt, trap, capture, wilfully disturb, or kill any bird of any kind whatever, or take the eggs of such bird within the limits of this reservation, except under such rules and regulations as may be prescribed by the Secretary of Agriculture.

Warning is expressly given to all persons not to commit any of the acts herein enumerated under the penalties of section 84 of the United State Criminal Code, approved March 4, 1909 (35 Stat. 1104).

This reservation to be known as San Francisco Bay reservation.

WOODROW WILSON,

The White House, August 9, 1916.

A TAMALPAIS GAME REFUGE A POSSIBILITY.

Large holdings on the northern watershed of Mount Tamalpais have been purchased by the Marin Municipal Water District. Much of this territory was formerly leased by the Lagunitas Rod and Gun club and game is very plentiful. Fearing that the opening of this area to the public would have the effect of destroying the game and thus taking pleasure from those who will use this territory for outings, a movement is on foot to make of this land a state game refuge, either under the section which allows the creation of reservations on private lands or by legislative enactment. Congressman William Kent, who is backing the scheme, has offered to contribute a sufficient sum to police the refuge.

Fig. 6. Saving fish from overflowed areas in the Yolo Basin. The fish saved from death in this way are planted in other streams of the state. Photograph by McCurry Company, August, 1916.

TURKEY BUZZARD AND DISEASE.

Support for our contention that the turkey buzzard can not be considered a serious menace so far as its disease-carrying proclivities are concerned, as reported in CALIFORNIA FISH AND GAME for October, 1915 (Vol. 1, page 222), has come in a recent bulletin of the United States Biological Survey (Common birds of southeastern United States in relation to agriculture. Farmers Bull. 755). On pages thirty-eight and thirty-nine of this bulletin Mr. W. L. McAtee makes the following defense for the buzzard:

The turkey buzzard now is threatened with persecution in the land where heretofore it has received the most zealous protection, for the bird has been accused of spreading such diseases of live stock as hog cholera and anthrax. The charge that it spreads hog cholera has never been demonstrated, and until this is done

Fig. 7. Kern Buttes at mouth of Volcano Creek, a stream noted as the home of the golden trout. Photograph by A. D. Ferguson.

judgment should be suspended. Its relation to anthrax has been investigated, with the result that in the distribution of the disease the bird must be considered a minor agency as compared with man and various domestic and certain wild animals.

The nature of their food would indicate that buzzards have strong digestive powers. The spores of anthrax, or charbon, a virulent stock disease, have been shown by two independent investigations to be destroyed by passing through the alimentary canals of buzzards. Anthrax spores are not destroyed in the digestive tracts of other carrion-feeding animals, as the dog, cat, hog, chicken, or opossum.

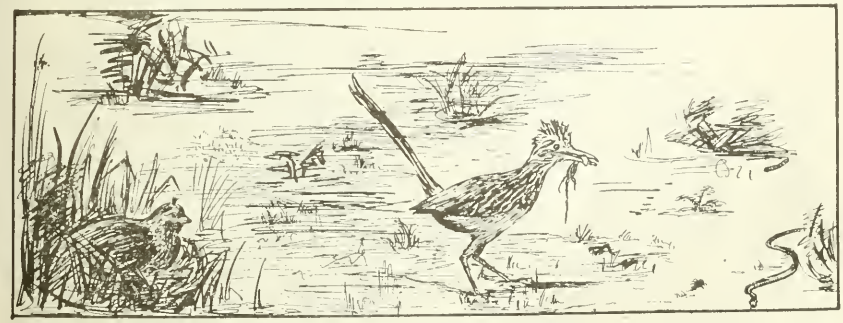
It is true that buzzards may carry the germs of anthrax or other stock disease on their plumage, feet, or bills, and thus distribute them; but all the other animals just mentioned may similarly carry disease germs on the surfaces of their bodies, as may also flies, domestic pigeons and other poultry, horses, mules, and cattle, not to mention members of the human family. In fact, at the same time that steps are being taken greatly to reduce or exterminate a wild bird—the buzzard—which may possibly play a minor part in the transmission of anthrax, farmers are harboring several domestic animals that have far greater possibilities as spreaders of the disease. The fact that anthrax may be carried by flies is more than sufficient to explain the most severe epidemics.

Obviously, it is unfair to attempt to place the blame for general dissemination of stock disease on the buzzard. Considering the multitude of ways in which these diseases may be spread, it can not be doubted that stock diseases would be as widely distributed as now if turkey buzzards were eliminated, as has been proposed. What amounts to proof of this is the fact that hog cholera at times is virulent and seriously destructive in regions where there are few or no turkey buzzards, as in certain northern states and Canadian provinces.

HABITS AND FOOD OF THE ROADRUNNER IN CALIFORNIA.

Results of further investigations of the economic status of nongame birds instituted by the Fish and Game Commission in 1911 have just been published under the title: "Habits and food of the roadrunner in California." (Univ. of Cal. Pub. Zool., vol. 17, no. 5, pp. 21–58, pls. 1–4, 2 figs. in text). For many years sportsmen have accused the roadrunner of destroying the eggs and young of valley quail and a study of the food habits of the bird was ordered. The contents of many stomachs of roadrunners were analyzed, but the results as shown by the following summary do not show the roadrunner to be a serious enemy of valley quail or other birds. Many specimens were secured in localities where quail were breeding but these showed no evidence that quails' nests had been disturbed.

The roadrunner (*Geococcyx californianus*) is unique in many ways. Of particular interest are its breeding habits



Figs. 8 and 9. Waterfowl in the marshes of Fresno County. Photographs taken on the Thornton Ranch in southwest Fresno County by E. W. Smalley, July, 1916.

and especially food habits. It is doubtful if an investigation of the food habits of any other American bird could have yielded such spectacular results.

The investigation here reported upon included analysis of eighty-three stomachs of roadrunners taken in southern California in 1911 and 1912 and also a survey of all available literature relative to the food of the roadrunner in California.

The eighty-three stomachs represented birds taken every month of the year with the exception of March. The analysis of the stomach contents showed that practically 90 per cent (90.07%) of the total food was made up of animal matter and that slightly less than 10 per cent was of vegetable material. Nearly all of the vegetable matter was of one kind, the fruit and seeds of the sour berry (*Rhus integrifolia*). Insects and certain vertebrates composed the animal food. Chief among the insects found were beetles (18.2 per cent), grasshoppers and crickets (36.82 per cent), cutworms and caterpillars (7 per cent), cicadas and other hemipterous insects (5 per cent), ants, bees, and wasps (4.24 per cent), and scorpions (3.67 per cent). Lizards of three species (3.73 per cent), one bird (1.56 per cent), and two wild mice of two different species, composed the vertebrate food.

The results of stomach examination substantiated rather than altered published statements regarding the food of the roadrunner. From published sources, however, came added information as to the number of snakes and lizards consumed by this bird and practically all of the information regarding its bird-eating habits. One lizard, the whip-tailed lizard (*Cnemidophorus*) appears to be eaten more often than any other species.

The roadrunner's individual capacity for food is great, for an average full stomach contains about ten cubic centimeters of food. The collective capacity, however, is small, due to fewness of individuals. The amount of damage possible (and this must be said also of the potential good) is greatly minimized because there is no concentration of individuals in any one place. A wide variety of food items from small insects to reptiles and mammals is consumed.

Little evidence was obtained that the roadrunner is detrimental to man's interests. The destruction of a few beneficial insects and birds, and of certain lizards usually considered beneficial, can alone be taken as evidence against it. Even if the consumption of a certain proportion of all of the above as food be a fixed habit, the end result is minimized when the facts are taken into consideration that the roadrunner is a bird of the desert regions rather than of the cultivated fields and that the species exists in but small numbers.

A preponderance of evidence favors the bird. The destruction of such unquestioned pests as grasshoppers, cutworms, caterpillars, and wireworms, and of such rodents as mice is to be desired even if the amount of destruction be relatively small. The taking of this sort of food on wild land is evidence that this bird when feeding in cultivated fields is likely to be distinctly beneficial.

Evidently the roadrunner never turns its attention to any sort of cultivated crops as do those birds with granivorous and frugivorous habits. On the contrary, a study of its food habits shows that the roadrunner feeds upon the insect and rodent pests which attack cultivated crops, and furthermore that it destroys hairy caterpillars, a pest not commonly attacked by other birds.

The investigation has also shown that the bird-eating habit of the roadrunner has probably been exaggerated and that the killing of the roadrunner by man as an injurious species is unjustified. The benefits conferred by the roadrunner in

Fig. 12. Decoy geese. Property of "Goose" Lewis of Dixon, California. Photograph by George Neale, May, 1916.

the destruction of insect and rodent pests plus its esthetic value leaves a balance distinctly in favor of the bird and marks it as a beneficial rather than an injurious species.

A "PAT ON THE BACK."

We have scrupulously refrained from publishing the many letters praising the work of the commission which come to the editor's desk, but the following editorial from the Ukiah *Times* for November 1, 1916, is such a fine appreciation that we can not refrain from giving our readers a chance to see it. Such a "pat on the back" is certainly encouraging.

GAME COMMISSIONERS DOING VALUABLE WORK.

"Through the courtesy of the State Board of Fish and Game Commissioners a copy of CALIFORNIA FISH AND GAME for October lies on *The Times* desk. It is the official monthly publication of the commission and the latest issue is the fourth number of the second volume. Not only is the board to be complimented on the contents of the October issue, but the editorial staff deserves commendation for the typographical makeup and neat appearance of the pamphlet.

"When the public realizes that all the commissioners are engaged in a labor of love, serving without financial consideration, the energy, judgment and hard work which they are throwing into their official task will be seen to entitle them to be regarded as mighty faithful servants of the people; this means of the public as a body, for while sportsmen are most keenly interested in the work of the commission, the propagation and conservation of game form a state asset, in the benefits of which every citizen figures.

"Inasmuch as the commissioners draw no salary, *The Times* is of the opinion that they should at least be made to feel that in a measure their reward lies in public appreciation of the value of their services. They are engaged in a large and important work, and the intelligent and faithful performance of their duties will prove of immense value to the state."

OBTAIN AN AUTHORITATIVE WORK ON PHEASANT BREEDING FREE.

Through the courtesy of the American Game Protective Association we are enabled to offer free of charge to game breeders in this state a limited number of copies of E. A. Quarles' authoritative work "American Pheasant Breeding and Shooting." Everyone engaged in pheasant breeding and everyone who contemplates rearing these birds should possess a copy of this book. Make application to Bureau of Education, Publicity and Research, Museum of Vertebrate Zoology, Berkeley, Cal., and include six cents in stamps to cover postage.

GAME BIRDS FOR SALE.

The stock of game birds at present held on the State Game Farm at Hayward will be sold at reasonable prices to game breeders. The species represented are: ring-necked, golden and silver pheasants and valley quail. Ducks of the following species are also offered: mallard, pintail, spoonbill, cinnamon teal, green-winged teal and fulvous tree-ducks. Apply to Superintendent, State Game Farm, Hayward, Cal., for prices.

HATCHERY NOTES.

W. H. Shebley, Editor.

COMPLETION OF HATCHERY OPERATIONS FOR THE SEASON 1916.

On November 7, the fish distribution car left Sisson with the last shipment of trout fry for southern California, and this completed the work of the hatcheries for the season of 1916. While the total number of trout fry distributed during the season of 1916 has been less than during 1915, we believe that, taken as a whole, the results have been more satisfactory. We were able to give the fish a wider distribution this season owing to the fact that we had more hatcheries in operation and were better equipped to hold and rear the fry at the smaller stations. With the improvements made at Bear Valley and Snow Mountain stations, and the construction of Fort Seward and Almanor hatcheries, our facilities for rearing and distributing trout fry have been greatly increased. With Sisson hatchery relieved of a portion of the work of hatching, rearing and distributing the fish, overcrowding of the fry in the hatching troughs was avoided to a considerable extent and as a result those distributed this season were stronger, healthier fish and reached the streams in better condition than in former years.

Improvements made in our distribution car 1, the installation of a larger and more efficient engine and air compressor in car 2 and a better system of the distribution of air in the cans on both cars have been contributing factors in the successful results obtained in fish distribution work this year.

From Sisson hatchery we distributed 1,950,000 rainbow, 1,850,000 eastern brook, 1,725,000 Loch Leven, 950,000 black-spotted, 2,800,000 steelhead and 75,000 German brown, a total of 9,350,000 trout fry.

From Tahoe hatcheries, 209,000 rainbow, 50,000 eastern brook, and 2,765,000 black-spotted, a total of 3,024,000 trout fry, were distributed.

Steelhead trout fry to the number of 490,000 were distributed from Ukiah hatchery and 184,000 steelhead fry from Snow Mountain station.

From Fort Seward hatchery there were distributed 95,000 rainbow, 132,000 black-spotted and 924,000 steelhead, a total of 1,151,000 trout fry.

From Almanor hatchery 202,000 rainbow trout fry were distributed.

From Brookdale hatchery 881,000 steelhead fry were distributed, from Bear Val-

Fig. 13. A rainbow trout, 29½ inches in length. Caught by Mr. and Mrs. Frank Mason of Fresno, at Bass Lake, Madera County. Photograph by R. S. Kimball.

ley hatchery 750,000 rainbow, and from Marlett-Carson hatchery 55,000 eastern brook, making a total number distributed from all of our hatcheries of 16,087,000 trout fry.

A NEW FOOD AND GAME FISH FOR SOUTHERN CALIFORNIA COAST COUNTIES.

During the early spring of 1916 we endeavored to obtain a supply of small striped bass for the southern California coast county streams by seining in San Pablo Bay.

On May 28 a shipment of about 300 small striped bass were obtained and shipped to Senator E. S. Rigdon of Cambria, San Luis Obispo County, who liberated them in Morro Bay at the mouth of Chorro Creek. Several times through the summer months an endeavor was made to continue this work, but weather and tide conditions were not favorable and efforts were not successful. The work was again taken up during the middle of October and, as conditions were favorable at that time, a fine shipment was procured. The seining operations were carried on near Vallejo under the supervision of Deputy H. E. Foster. Deliveries were made to Senator Rigdon, who planted 600 striped bass in the mouth of San Luis Creek, at San Luis Bay, and 400 at the mouth of Corral de Piedra Creek near Pismo, in San Luis Obispo County. The Los Angeles division of the Fish and Game Commission received 2,200 striped bass, and 200 of these were liberated in Anaheim Bay and 2,000 in the lagoon at Sunset Beach, Orange County. A third consignment consisting of 1,800 striped bass was delivered to H. R. Asher, secretary of the San Diego Rod and Reel Club, and liberated in Mission Bay, San Diego County. If the results of these plantings of striped bass are successful, a new and valuable game and food fish will be added to the waters of southern California.

SCREEN AND LADDER OPERATIONS.

During the past two or three months considerable progress has been made in the installation of fish ladders. The following is a list of the ladders that have been completed, which have not been heretofore reported:

The Valdor Mining Company has completed the construction of a fishway over its dam in Canyon Creek, Trinity County.

The same company has installed a screen in its canal diverting water from Canyon Creek, Trinity County.

A fish ladder has been completed over the dam of the Northern California Power Company in Tehama County, at Inskip Ditch, below south power house.

Under the supervision of Deputy J. S. White, a fish ladder has been installed over the Butters Dam, in Big Backbone Creek, in Shasta County.

A ladder has been installed over the Ellsworth Dam in Campbell Creek. This dam is the property of Santa Clara County.

William Shaughnessy has completed the construction of a fish ladder over his dam in Sierra County, in the south branch of Middle Yuba River.

The dam of C. J. York, in Middle Yuba River, Sierra County, has been provided with a fishway.

Overflow and underflow current fish ladders are now under construction over the Mendota Weir, in San Joaquin River, Fresno County. This weir is the property of the Miller & Lux Company.

The Crown-Willamette Paper Company has commenced the construction of a new fish ladder over the Floriston Dam, in Truckee River, Nevada County.

A fish ladder is being installed over the dam of the Anderson Irrigation Project, in Sacramento River, Shasta County.

From recent reports received from Santa Clara County, we find that screens have been installed in irrigation ditches of J. W. Dickson, diverting water from Penitencia Creek; M. D. Knoble of Berryessa; P. Mason of San Jose; G. W. Page, diverting water from Campbell Creek; Sorosis Fruit Company, Campbell Creek; and La Hoydie Irrigation Company, Campbell Creek.

Two new screens have been installed by the Trinity Gold Mining and Reduction Company, in Trinity County. The Western States Gas and Electric and the La Grange Company have screens ready for installation in their ditches in Trinity County as soon as the water is turned in next spring.

A screen has also been installed in a ditch diverting water from the east fork of Stewart's Fork of Trinity River, Trinity County, by Mrs. A. Baudrey.

The California-Oregon Power Company is planning to install a large screen of special construction in its canal diverting water from Shasta River, Siskiyou County.

of the north coast counties well stocked, and it is our intention to also propagate enough salmon fry to keep up the supply of this valuable commercial fish in Eel River.

Work has been completed for the season on Almanor hatchery located at Lake Almanor, Plumas County. A hatchery building 22 feet by 40 feet, equipped with

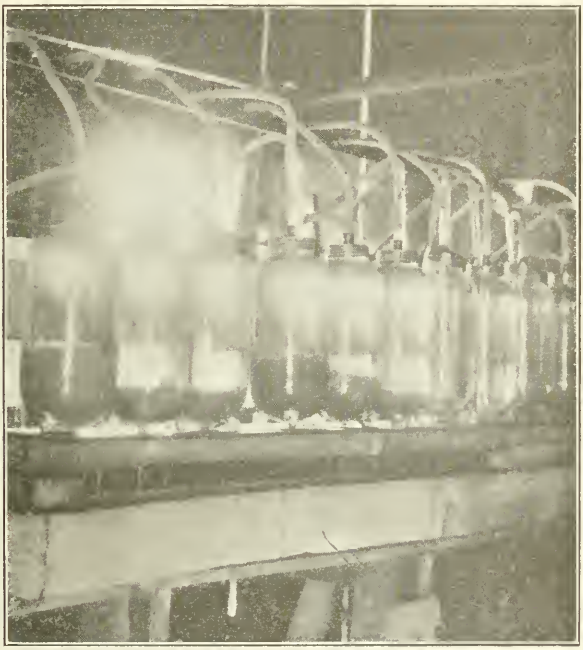


Fig. 14. A "shad battery" at Yuba City hatchery. The photograph clearly shows the manner in which shad eggs are hatched.

PREPARATIONS FOR NEXT SEASON'S HATCHERY OPERATIONS.

The construction of Fort Seward hatchery, Humboldt County, is nearly completed and we expect to have the station in first-class shape for salmon hatching operations this season.

Improvements have been made in the hatchery building by the installation of new hatching troughs. The hatching troughs and the building inside and out have been painted. The superintendent's residence has been completed and additions to living quarters for assistants have been made.

Fort Seward hatchery will be well equipped for handling both salmon and trout. We will be able to rear enough trout at this station to keep the streams

sixteen hatching boxes and all necessary paraphernalia for operating the hatchery next season, and comfortable living quarters for the employees have been constructed. A large fish-holding tank, fish racks, flume and trap have been built and stored ready for installation as soon as operations are commenced in the spring. The work was finished on November 17.

A small eyeing station consisting of ten hatching troughs has been installed at Domingo Springs.

A large fish-holding tank, racks, flume, trap, etc., have been built and tools and egg collecting apparatus are stored at Rice Creek Spawning Station, near Domingo Springs, ready for installation as soon as operations are commenced. The necessary tent, cook stove and complete

camp equipment have also been stored at Rice Creek station and Domingo Springs.

During the latter part of September the construction of the Rae Lakes egg collecting station was completed. Materials, supplies, tools, etc., were taken to the lake over the Oak Creek Pass and stored in a firmly constructed galvanized iron building 8 feet by 14 feet, which was built during the summer. A supply of provisions was also cached to be used by the assistants next spring when they make the trip in to commence the egg collecting work. Rack and trap material was also taken into the station and preparations made for installing the paraphernalia when egg collecting operations are commenced. It was necessary that absolutely every article for the operation of the station, as well as camp equipment and food for the men engaged in the work, be foreseen and taken in during the summer, as the assistants will have to go into the station next spring over the Oak Creek Pass, via Diamond Peak, the highest point of which is over 12,000 feet, and will be able to pack only their blankets with them.

The rainbow trout eggs taken at Rae Lakes station will be hatched and reared at the new hatchery now under construction on Oak Creek, Inyo County, from which point they will be distributed in the streams of southern California.

On October 1, operations were commenced in an endeavor to obtain a supply of eastern brook trout eggs from Marlett Lake, Nevada. The California Fish and Game Commission and the Nevada State Fish Commission entered into an agreement to cooperate in the work and divide the eggs secured equally between the two commissions. The eggs are taken from tributaries of Marlett Lake, near the lake shore and from Hobart Creek at Red House and transported by teams to Verdi hatchery, where they are eyed and prepared for shipment to Sisson hatchery. Heavy rain and snow storms set in, however, and it was not until October 12 that our assistants were able to leave Carson City, Nevada, on the trip into Marlett Lake. On account of the heavy fall of snow, which was from one to three feet deep, they were unable to get farther than Red House. Temporary camp was made at this place and on the fifteenth the crew went on to the lake on snowshoes. Marlett Lake was found to be covered with a thin coat of ice. As no fish were running, due to the heavy storms and cold weather, the crew returned to Red House, where a few trout were running in Hobart Creek, and where racks and trap had been installed. On the seventeenth, camp was moved to Marlett Lake and racks installed in the largest stream flowing into the lake. The run of

Fig. 15. The McCloud River station of the United States Bureau of Fisheries. It is here that most of the salmon eggs are secured for stocking the streams of California.

spawning fish soon started, but owing to the continuance of the storm and extremely cold weather, the runs at both Marlett Lake and Hobart Creek have been very light and it is improbable that the take of eggs will be large. Up to December 1, 1916, 569,000 eggs had been secured.

MOUNT WHITNEY HATCHERY.

Mount Whitney hatchery, located on Oak Creek, four and a half miles from Independence, the thriving county seat of Inyo County, is nearing completion. This beautiful structure, when completed, will be the most modern and up-to-date hatchery in the world. It is constructed of granite and gabro, and the coloring of the rubble walls blending harmoniously into the background of giant peaks that form the west wall of the valley leaves an impression that will long be remembered. The work of the Department of Engineering on this structure will be completed about January 1, 1917. The hatchery equipment and apparatus necessary to handle the millions of eggs that are to be hatched at this station in the near future will be made by the employees of the hatchery department. The building is 200 feet long by 45 feet wide, and has a hatchery capacity of 6,000,000 eggs. This building is the first unit of a series of modern hatcheries and batteries that will make up this station when the whole plan is finished.

The ample supply of pure water in Oak Creek that gushes from the granite rocks of the basal slopes of the Whitney range is sufficient to furnish this plant with all the water necessary for its development for a quarter of a century.

An almost unlimited supply of eggs can be obtained from the Rae Lakes, if fishing is prohibited in these waters. To insure a supply of rainbow trout eggs for all time, the Rae Lakes basin should be set aside as a state fish preserve during the coming session of the legislature. This can be done by creating a fish and game district of the basin in which the lakes are situated and prohibiting fishing in the district set aside as a preserve. This is necessary to insure a supply of eggs for this new station. When the new trail is completed to the lakes, hundreds of anglers will rush there to enjoy the wonderful fishing that these lakes afford. There are thousands of rainbow trout in these lakes, but to furnish eggs sufficient for a station of the size of the Mount Whitney hatchery, it will be necessary to conserve these fish for spawning purposes.

The importance of Mount Whitney hatchery is best understood when it is realized that the whole of the state south

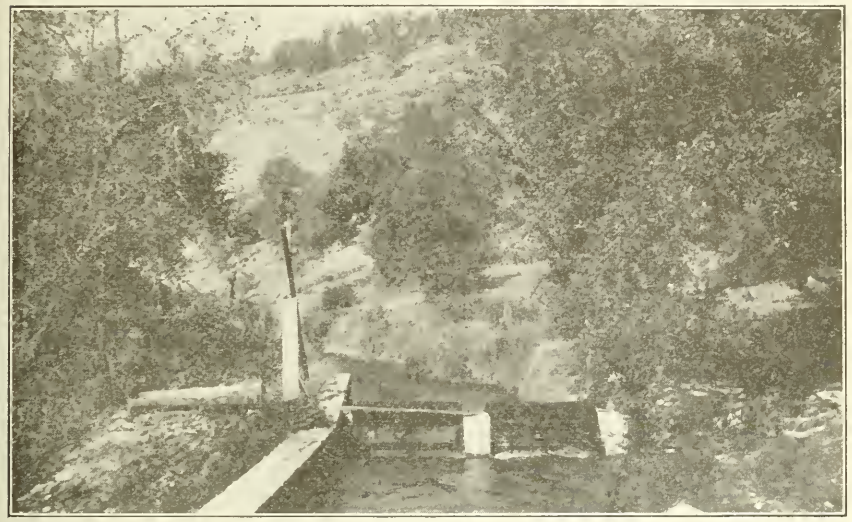


Fig. 16. Screen installed in the canal of the Northern California Power Company on the Colman Ditch from Battle Creek, Tehama County, California. The screen wheel is ten feet in diameter and the water seven feet deep. Photograph by A. E. Culver.

Fig. 17. A view of one of the Rae lakes. Eggs for the new Mount Whitney hatchery will be secured here.

of the Tehachapi Mountains and as far north as the Yosemite Valley will receive its annual supply of rainbow trout fry from this hatchery. Mount Whitney hatchery is not built for a day or a decade, but is planned for the coming years, as California's fame as an anglers' paradise grows. It will be able to keep stocked those streams depleted by the increasing demands made upon them as the population increases.

COMMERCIAL FISHERY NOTES.

N. B. Scofield, Editor.

THE 1916 TUNA PACK.

The 1916 tuna pack for California will exceed that of last year or of any preceding year, but with all that the year has been a disappointing one for the canners. With a strong demand for all the tuna they could put in cans, nearly all of the packers had improved or enlarged their plants, and more fishermen were employed with the intention of doubling their output if possible. Even with the incentive of a higher price the fishermen were able to take but few more fish than last year. Although the pack is a little larger this year it is certain that the fish were not nearly so plentiful. We will always be uncertain as to what the tuna catch will be, for it is a pelagic fish and its feeding ground and possibly its place of spawning shifts with the shifting currents.

Last year large albacore (tuna) were found to be plentiful far out in the open sea fifty to seventy miles southwest of San Clemente Island. On account of the great distance from the canneries it was unprofitable to go after them with the small boats now employed. This year a few larger fishing boats were built with the idea of going after these large fish, but they did not succeed in locating them.

Some of the more successful Japanese fishermen who have prospected in these off-shore regions believe that fishing "banks" will be found where albacore may be taken the year round. They also believe that the "run" of albacore is not so much a movement up the coast as it is a movement toward the coast from these off-shore banks.

There are a number of reasons for this belief. The fishermen have been unable to follow schools in any extensive movement up the coast. The fish usually appear first well off shore and later move closer in. A school of exceptionally large

albacore will appear at one place and will not be taken later either to the north or to the south. In 1914 a school of very small albacore averaging four and one-half pounds in weight appeared off San Pedro. These fish were not traced either to the north or to the south of this place.

It has been demonstrated that such fish as the herring and sardine of Europe do not migrate up and down the coast as formerly supposed, but that the movement is shoreward from the open sea, and that while the herring are all of one species, each locality has a race of herring that in quality or size is peculiar to and constant in that locality. If there was a general movement along the coast the character of the fish in the different places along the coast would not be constant. The herring on our Pacific coast shows this same race difference in different localities, and it is barely possible that the albacore may be found to exhibit these race differences at different localities along our California coast.

It is of interest to know that the young of the albacore have never been observed. To our knowledge, the smallest albacore captured in California weighed three pounds. No albacore with noticeably developed spawn have been taken by any of the cannery fishermen. The ovaries and spermaries of the fish usually show no development at all and it is only rarely that one with even immature spawn is observed. The largest albacore so far recorded weighed seventy-six pounds. This one, with several others nearly as large, was taken near San Pedro during the last week of October, 1916.

There were 397 fishing boats employed in the tuna fishery this year, each boat being manned by a crew of three. Half of the tuna fishermen are Japanese and this one-half catches 85 per cent of the fish.

A YELLOW-FINNED ALBACORE FROM THE MEXICAN COAST.

A fish sent to us for identification from near Mazatlan, Mexico, has been pronounced by Dr. C. H. Gilbert the yellow-finned albacore, the albacore most common in Japan and usually called the Japanese albacore. It is found in the Hawaiian Islands and a few individuals have been taken in southern California by the fishermen while fishing for the long-finned albacore or tuna. It is reported that these fish are plentiful near Mazatlan.

MUSSELS GROW RAPIDLY.

In investigating the rate of growth of some of the sea animals in Monterey Bay, Dr. Harold Heath, Department of Zoology, Stanford University, found that the sea mussel (*Mytilus californianus*) grows from the egg to a length of three and one-half inches in one year. He found also that both the acorn and goose barnacles reach sexual maturity at the age of eighty days.

Fig. 18. Fisherman's Wharf, San Francisco. Photograph by H. H. Hunt, April 12, 1916.

A COMMERCIAL FISHERIES TAX BILL.

The Fish and Game Commission has prepared a bill, to be introduced at the next session of the legislature, which is designed to increase the revenue of the commission that it may better carry on its commercial fisheries work.

Since the legislative session of 1909, the Fish and Game Commission has received no appropriation from the state, as the revenue derived through the hunting, angling and commercial fishing licenses was deemed sufficient for all the needs of the commission. But with these funds the game patrol service has been greatly extended, the commission's activities have been increased and the output of trout from the hatcheries has been so enlarged to meet the ever-increasing demand for stocking the streams that the revenue derived from the hunting and angling licenses is all needed for these purposes. There is left then for the commercial fisheries the revenue derived from the commercial fishing licenses and the wholesale fish dealers licenses, which together amount to less than $35,000 per year. This amount is entirely inadequate to carry on an effective fisheries patrol; to propagate commercial fishes; to carry on the investigation work so necessary for the conservation of our fisheries; and to pay the fishery's proportionate share of the executive expense of the commission.

In supplying the revenue for the support of the commission, each activity under its jurisdiction should bear its proportionate share. As already stated, the commercial fisheries are not furnishing their proportionate share at the present time, and in the future expansion of the fisheries, which is already upon us, they will fall short still more.

Within the last few years our fishing industries, especially those carried on in the open sea, such as the tuna, halibut, sardine and trawl fisheries, have developed enormously. There is now a very great need of a better fisheries patrol and of a thorough investigation of the commercial fishes if we are to conserve these industries with intelligence. Some of our fisheries are bound to be developed, even without state aid, faster than we can gain the necessary knowledge for their conservation. The people will learn to eat species of fish that are now little used. Our fish are gradually being sent to more distant markets. The eastern United States is now drawing heavily on our salmon, shad, tuna and sardines, and is bound to draw more heavily on these and others of our fishes in the future. The great increase in the demand for all kinds of canned fish is another feature we must recognize if the fisheries are to be successfully regulated in the future. Our most important problem is how to get the most out of our fisheries without injuring the source of supply. In other words, to use the interest without drawing on the principal.

Our fisheries can be adequately conserved only when we have learned the life histories of the different market fishes; when we have learned the effect of the fishing methods in vogue, and when we know how much each fishery will yield without injuring the supply. This knowledge must be applied by framing such protective laws as may be necessary; by enforcing these laws by an adequate patrol service, and by aiding species by artificial propagation where that method is feasible. These are necessary steps that should be completed as soon as possible. They are steps that should be well provided for by the state before a campaign is started to further develop the fisheries. To use a revenue from the fisheries at this time for any but these purposes would be a serious mistake, and any reasonable revenue which they will yield will all be needed to carry on the conservation work now being conducted by the Fish and Game Commission.

CONSERVATION IN OTHER STATES.

PENNSYLVANIA ATTEMPTS TO RESTOCK THE STATE WITH RABBITS.

The attempt has been made by the Pennsylvania Fish and Game Commission to purchase thousands of rabbits from other states to be used in restocking. Although promised carloads of rabbits from Kentucky, none was secured because those who caught the animals put them in a box or enclosure together, with a result that but one rabbit remained the following morning, it having killed the others. An offer of thirty cents apiece f. o. b. at their shipping point also failed to secure rabbits from localities where they were said to be so abundant as to be a nuisance. Instead of tens of thousands of rabbits which it was planned to secure only about 2,500 have been obtained.

Efforts to secure quail have also failed because of the inability to purchase them at reasonable prices.

ANGLERS IN MICHIGAN WORRIED.

Anglers in Michigan are worried over the statement by Dwight Lydell, superintendent of one of the state fish hatcheries, to the effect that although more fish were planted this year than ever before, yet the lakes and streams of Michigan are in serious danger of being devastated of fish. He says: "Fishing seems to be drawing more people every year and the popular varieties of fish are being removed faster than we can plant them with the small appropriation of $80,000 allowed us by the state legislature." Approximately 90,000,000 fish were planted in Michigan this year, as follows: Trout, 6,000,000; perch, 50,000,000; blue gills, 1,000,000; bass, 3,500,000; wall-eyed pike, 25,000,000.

MINNESOTA COMMISSION MAKES USE OF MOVIES.

The Minnesota Game and Fish Department has prepared moving picture films illustrating the artificial propagation of different varieties of Minnesota fish. Films of commercial fishing scenes and bird and animal life also are being prepared. These will be loaned, on application, to responsible organizations, and talks in explanation of the pictures will be given by the commission or the superintendent of fisheries wherever possible.

BUTTON LAW FOR HUNTERS IN NEW YORK STATE.

A new New York game law, among other regulations, provides that all licensed hunters must wear, conspicuously displayed, a button, at least two inches in diameter, to be furnished by the state. In other words, the hunting license must be kept in plain sight.

LIFE HISTORY NOTES.

THE SNOWY OWL AGAIN INVADES CALIFORNIA.

It is a well-known fact that the snowy owl (*Nyctea nyctea*) is of erratic occurrence in eastern states. It now appears that this bird occurs periodically in this state also. Just twenty years ago (1896) a number of snowy owls invaded the northern part of California. Specimens were taken as far south as Bay Farm Island, Alameda County (Cohen *in* Condor 3, p. 185) and Santa Cruz County (Thompson *in* Condor 3, p. 141).

During the same year snowy owls were reported as numerous in the state of Washington (Bowles *in* Osprey 1, p. 81). According to H. G. Smith (Nidologist 3, p. 76) snowy owls were taken in the state of Colorado in 1886.

The following additional data on the occurrence of the snowy owl in California in 1896 has been furnished by H. S. Prescott of Crescent City, Del Norte County:

Ely Charter of Crescent City, Del Norte County, secured two or more specimens, in 1896. One of these was mounted and for many years was in the possession of Mr. Jeffrey, the keeper of the Crescent City lighthouse. H. J. Lattin, residing near Arcata, also saw a number of these birds in that year.

In November, 1916, a male specimen of a snowy owl, secured by Florence F. Williams on the ocean beach near the outlet of Talowa Lake, Del Norte County, was sent us by H. S. Prescott. A second specimen, a female, was secured by Mr. Prescott on November 25 between the north end of Lake Earl and the mouth of Smith River, Del Norte County. Along with this bird was a report to the effect

that Ely Charter had seen nine snowy owls between Point St. George and the mouth of Talowa Lake. Two other specimens are noted as having been taken in the county in a newspaper item appearing in the Humboldt *Times* under date of November 23. Several applications for permits to hold birds in captivity have since been sent to the Fish and Game Commission by parties in the same vicinity who have secured snowy owls alive.

On November 18, through the kindness of George Neale of the Sacramento Division of the State Fish and Game Commission, we received another snowy owl, secured by Edward Bolt of Gridley, Butte County. The stomach of this bird contained parts of a mudhen.

The above is sufficient evidence to show that snowy owls have again made their appearance in California, probably for the first time since 1896. All three of the above specimens have found a place in the Museum of Vertebrate Zoology, where they will be of permanent value to the state.—H. C. Bryant.

DUCKS ARRIVE EARLY.

Ducks arrived very early this season. Several canvasbacks were seen on San Pablo Bay August 20, 1916. Pintails were unusually abundant at this time of year, and a few bluebills were also seen. Deputy Hoen reported to me that canvasbacks were seen on Tomales Bay during the latter part of August.—H. E. Foster.

ONLY A FEW DUCKS DIE AT TULARE LAKE.

The fact that but few ducks have died this fall on Tulare Lake has again upset the theories regarding the peculiar malady which periodically has affected the waterfowl on this lake. If the water of the lake is responsible for the disease it seems strange that last year when the lake was the dryest it has been for some time, only a few birds were found dead. This year, with an abundance of fresh water and the lake 16 to 18 miles across, larger than it has been in years, no serious outbreak of the disease has occurred. On the other hand, in 1910 when the Kings River ran into the lake from the middle of March until the middle of October and the lake was even larger than at present, the largest death toll of any year resulted. It is to be hoped that the decrease in the number of affected birds noted during the past two years will continue and that the trouble is mainly over.—E. W. Smalley.

DUCK DISEASE.

The only place where duck disease has appeared in the Lower San Joaquin Valley this fall (1916) is on a small lake, formed by the overflow from Bull's Slough, on the northern border of Kern County. The lake is located just north of the old Fowler House, a landmark of the country, and is about one mile wide and three and one-half miles long. On the banks along the border of the lake I estimated there were fifty dead ducks to every one hundred feet. When visiting this section on the 21st day of July, 1916, no birds were found. Apparently, therefore, the ducks began dying some time during August.—Tipton Mathews.

GAMBEL QUAIL TRANSPLANTED.

Two dozen Gambel quail (*Lophortyx gambeli*), obtained from Mr. Kenneth Hayward of Thermal, Riverside County, were liberated on Mount Rubidoux, near Riverside, the last of September. The birds were obtained under permit from the Fish and Game Commission. The transplantation was made in the hope that these desert quail would increase and add interest to Mount Rubidoux. The birds will be carefully protected and fed regularly.—J. S. Logan.

UNUSUAL DUCKS VISIT INTERIOR.

Several species of winter visitant ducks, which formerly were seen commonly in northern California and which are now practically unknown or unrecognized by the younger generation of waterfowl shooters, have been observed this season. Ducks of several different species have been brought to the Sacramento office of the Fish and Game Commission for identification. Three are of particular interest: the lesser scaup, or "bluebill," which, twenty-five years ago, frequented the unreclaimed islands of the lower Sacramento; the American goldeneye, and the beautiful bufflehead or "butterball." The goldeneye has even appeared in the markets in Sacramento this year. The wood duck, which nested in large numbers in the timber bordering the banks of many sloughs and rivers of central and northern California, also has been unusually common this winter.

The presence of these ducks augurs well for the future. The present federal and state laws may be responsible for the return of these species. Certain it is that it has been many years since these ducks

have been seen in any numbers in this section.

Quite a number of wood ducks were seen on the opening day of the season and several were killed. Unfortunately, a duck is simply a duck to most shooters, who do not know or care what species of ducks and other waterfowl are protected at all times. Such shooters kill the bird only to learn later that it is unlawful to shoot the same. We have seen a perfectly honorable law-abiding sportsman kill a swan, supposing it to be a goose, and kill wood ducks for teal or other ducks. There is nothing more interesting to the true sportsman than knowing the species, even to the sex thereof, before shooting. No two species fly alike. Every species of duck has its peculiar mode of locomotion. Some use a slow motion of wing, some very fast, as do the quail. The short-winged ducks, such as the teal, goldeneye and ruddy, are not only recognized by their rapid flight but by a peculiar motion all their own that can not be explained or described, but which can not be forgotten when once learned. The movements of birds should be observed closely by the hunter, so that he may tell at a glance what species he is about to kill. The wood duck (which is protected all the year) is one of the easiest of ducks to distinguish, both by flight and plumage. This duck, especially the female, appears to have small spectacle rims on each side of the head, a mark very plainly discernible. Both have plumes on the crown, the male plume being larger than that of the female. The female, when flying, invariably has a peculiar cry as though it were in pain.

More study of the bird and less thought of how many birds one can kill will prove interesting, and, furthermore, will mean the saving of some of the species from extinction. If hunters persist in shooting everything, irrespective of kind, arrest and severe punishment will be used to compel them to have more care.—George Neale.

THE MOUNTAIN LION AN ENEMY OF THE SKUNK.

The following evidence bears on the food habits of the mountain lion. Evidently lions do not confine their attention wholly to deer.

On November 8, 1916, our shepherd dog treed a young California lion a short distance below our ranch, near Coulterville, Mariposa County, California. My father, on approaching the lion, which had taken refuge in a live oak tree, noted an odor of skunk. After the lion had been killed the stomach was found to contain a half-chewed skunk, a striped one, judging from the black and white hair found. The lion was only a small one, weighing in the neighborhood of thirty-five pounds.—Donald D. McLean.

UNITED STATES FOREST SERVICE COOPERATION.

L. H. Whiteman, Editor.

QUAIL BECOMING SCARCER IN THE STANISLAUS NATIONAL FOREST.

Mountain and valley quail are getting scarce, valley quail being found in large numbers only in the southern portion of the Stanislaus National Forest. This is probably due to the increased number of hunters who go into the forest each year, and to the use of modern firearms. Also it is a well known fact that hawks get away with a large number of birds, especially in the high country. It is believed here that the mountain quail law should open with that for valley quail, since in some districts the young birds are hardly able to fly on September 1, when the present season opens.—E. D. Bach.

DEER IN THE EL DORADO NATIONAL FOREST.

Forest officers reported 128 deer killed during the 1915 open season within the El Dorado National Forest, and five without the forest, or a total of 133 reported by forest officers who are deputy fish and game commissioners. This number does not equal the number killed during the open season of 1914, which is a strong argument that deer are decreasing in number, and there were many more hunters in the mountains this season than during 1914. A rapid increase in the number of hunters may be expected in the future for the reason that the automobile furnishes rapid transportation to

and from the valley towns. It is recommended, therefore, that deer be further protected by allowing only one buck per man per season, and if in one or two years a slight increase in the number of deer is not seen, a closed season for at least three years should be enacted.—E. L. Scott.

EFFECT OF FOREST FIRES ON FISH.

In the summer of 1915 a very severe brush fire burned off all the brush cover along the headwaters of Tepusquet Creek in the Santa Barbara National Forest. Tepusquet Creek had good fishing in it before the rains came, but the rains that winter poured tons of dirt and ashes off the burned mountain sides into the creek, gullying the slopes badly. The fish holes were all filled up. The dirt and ashes evidently killed every one of the fish. Now the stream has not a fish in it, or any holes for them to live in during the summer if there were any alive.—J. R. Hall.

FOREST OFFICERS DESTROY PREDATORY ANIMALS.

More proof of the value of forest officers as protectors of game is found in a recent report from the Sequoia National Forest which states that two bears, thirty coyotes and five wildcats have been killed during the past year by forest officers.

THE SPIKED BUCK LAW.

The spiked buck law comes in for a good deal of comment from rangers of the Santa Barbara National Forest, as follows:

The spiked buck law is a good one: First, because the bucks are getting very scarce; second, because it causes the hunter to look closer at the deer before shooting, therefore preventing the killing of many does for lack of close observation.—Ranger S. H. Douglas.

The spiked buck law is a good thing in the right direction, and I believe has been universally observed; in fact, there have been very few reports of violations and in every case except one I have reason to doubt the truth of the reports, and I have investigated every report reaching me. The reported violations proved to be some one's suspicions. The presence of plenty of does and fawns and spiked bucks throughout the district is evidence of the integrity of the great majority of the hunters who have been in the field.

I have found a growing sentiment during the last several years in favor of a closed season of from three to five years in length and then a reduction of the buck limit—one buck and the season shortened anywhere down to one day. The sentiment in favor of a closed season has crystallized until I have heard almost every hunter that I have met this season make some such expression.—Ranger H. H. Hunt.

My idea of the spiked buck law is that it is all O. K.; saves more does than any law ever passed. The opening and closing of the season could not be better. The trout season is all right just as it is and the quail season also.—Ranger S. J. Rhyne.

BOY SCOUT COOPERATION.

NEW YORK SCOUTS TOLD HOW TO CONSERVE WILD LIFE.

[The following is the advice given the boy scouts of New York State by John B. Burnham, president of the American Game Protective Association. Scouts of California! Can't you make use of some of these ideas? What birds mentioned by Mr. Burnham are not found in California? Honorable mention will be given the California scout who sends in a correct list.—Editor.]

CONSERVATION AND WILD LIFE.

Conservation is preservation. It is founded on frugality and unselfishness. As applied to game and forests it does not mean that game shall not be killed nor trees cut down when needed for use, but it does mean that there shall be no wanton destruction and no unnecessary waste.

Only useful things must be taken as required, and then only when not in conflict with the right of others. Beautiful objects in nature must be spared and protected. Birch trees must not be marred by peeling the bark. Shrubs and trees must not be hacked and defaced. Names or signs must not be chiseled on rocks. Above all, beautiful and useful birds and mammals, not classed as game, must be protected with

the same spirit with which we protect our own good names.

Our natural resources are given us "in trust, for the benefit both of the present and the future. We must render an accounting of the trust to those who come after us!"

CERTAIN CARDINAL PRINCIPLES.

1. Way back in Deuteronomy we are told not to molest a bird on the nest. This is the earliest game law and the most fundamental. All creatures must be protected during the period of rearing their young. Otherwise extermination will result.

2. Do not let anybody rob bird nests. Protect the immature things from predatory creatures. If you have a cat which kills birds, put a bell on its neck and do not let it roam the fields, particularly in the nesting season.

3. Do not be a game or fish hog, and do not let others take more than a reasonable or legal limit. Sometimes the legal limits are too large, and sometimes there are no legal limits imposed. Here your moral powers should be exercised to prevent excess. Supplant the fallacy that nothing succeeds like success with the finer principle of sport for sport's sake. Taking game and fish with gun and rod in moderation is manly sport, but it is still finer to study the wild things and to secure as trophies photographs which are tokens of greater skill in woodcraft.

4. It is now illegal to sell almost every kind of game in almost every state in the Union. New York prohibits the sale of all game except rabbits and certain propagated and imported species. The market hunter is thus eliminated, but in some places game is still illegally sold by resort to subterfuge.

5. You can do much to preserve the game and birds by providing cover for them and food. Plant barren tracts with trees which can be procured from the Conservation Commission for three or four dollars a thousand. Plant also barberries and haws and other food-bearing shrubs which can be procured at small cost from commercial nurseries, or plant even cherry stones and apple seeds and willow suckers. You will have the satisfaction of seeing something grow where nothing grew before, and the knowledge that you have done something of value to posterity.

6. Many birds and animals die in cold weather from temporary causes. Often they need only a trifle of food to supply their needs till the snow settles, or the ice melts from seed-bearing weeds and shrubs. Here much good can be done by distributing suitable grains or other food in the swamps or other places in which wild life resorts. Read "Wild Bird Guests" and other books which give information on this subject.

7. Know the game laws. Remember that all wild birds in the state are protected at all times, together with their eggs and nests, except English sparrows, starlings, crows, hawks, crow blackbirds, snow-owls, great-horned owls and kingfishers, and the game birds.

The birds classed as game are limited in number in this state and it is an easy matter to learn the list. They are the waterfowl, including geese, brant and river and sea ducks; the marsh birds, including rails, coots, mudhens, and gallinules; the upland game birds, including grouse or partridge, pheasants and quail; and the shore birds, such as woodcock, snipe and plover. Knowing the birds which may be killed, it is easy to be sure of those which may not be killed and, thus informed, to prevent others from taking the lives of those cheery and useful friends of humanity. To know when game birds are being killed illegally, however, it will be necessary to study the state closed seasons.

A SAMPLE OF THE WORK OF ONE SCOUT.

[Here is a sample of the interest taken by one Scout. Scout Marriott is out after that prize and the rest of you will have to hurry.—EDITOR.]

SANTA MARIA, CALIFORNIA,
October 26, 1916.

State Fish and Game Commission of California.

DEAR SIRS: In regard to your game magazine, of which we received a copy, I notice it speaks chiefly about deer and I will tell you a few more things we find to be true.

One reason why our deer are lessening in number is because some of our citizens

kill deer before the season opens, kill does and fawns whenever no one is around that they know of and many kill more than two a season. This can easily be done, we find, by the hunter killing one, then after that is gone and if he has not been noticed by some ranger or game warden, he will throw the horns and skin away and go after his two deer which he says he has a right to kill. This is often used, I fear, and something should be done to stop it.

Another solid reason why our deer are few in numbers is because of the puma or mountain lion, which preys upon the deer. These beasts, I and many others find, kill on an average of ten per year, and a bounty of about $100 ought to be paid for the skin of a lion. There is only one good thing that the puma is good for and that is his fur; therefore, it would do no harm if they were entirely exterminated.

Yours truly,

(Signed) PAUL MARRIOTT.

SANTA MARIA, CALIFORNIA,
September 4, 1916.

State Fish and Game Commission,
Los Angeles, California.
To whom it may concern:

On your game laws (1915–1917), I find you have the dove season opening on September first.

This opening season date for doves I find does not give the parent birds time enough to hatch their young.

A week ago I was on a little hike by myself. I discovered three dove nests, one with eggs and the other two with baby doves about a week old in them. As this is a fine dove country there must be many more nests with the same aged occupants.

Yours truly,

PAUL MARRIOTT.
Tenderfoot Scout, Troop 1.

SANTA MARIA, CALIFORNIA.
October —, 1916.

State Fish and Game Commission
of California.
To whom it may concern:

In regard to the English sparrow or European house bird I find that in this district the bird nests from four to seven times a year and usually has from four to six eggs.

Its nest is very poorly constructed, and as it builds in some corner, nook or ornamental fixtures, it not only spoils the appearance of the building but has often caused fires.

In the fruit counties this bird nips the buds in spring, kills young birds of the song variety and fills air with its non-musical chirp. There seems to be only one bird that can hold its own with the English sparrow and that is the blackbird.

We have great difficulty in planting lawns here because as soon as the seeds are sown the pests arrive and they soon leave patches of bare ground.

I have built a nest box in my yard and the best way I find to exterminate them is to let them nest, then one by one break up the eggs. In this way the birds soon leave the nest and the box is soon filled by another couple which by the same way may be gotten rid of. Instead of taking them all at one time the parent birds can be caught and killed and the eggs also destroyed.

I have killed fourteen English sparrows since the troop received your letter.

If there is some better way of getting rid of them or anything else I can do for the Fish and Game Commission please let me know as I would like very much to have the honor of getting a pair of pheasants.

Yours truly,

PAUL MARRIOTT.
Tenderfoot Scout, Troop 1.

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING JUNE 30, 1916.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Sacramento, San Joaquin	Alameda, Contra Costa	Solano, Yolo	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
Albacore											404,653		1,335			405,988
Anchovy			98,775		825		2,771		21,780		9,443					133,594
Barracuda								347		56,900	717,434	13,937	306,903		164,059	1,259,580
Bonito																
Bocaccio							4,331		47,493							51,824
Bluefish																
Chilipepper									17,581							17,581
Carp			2,915	4,454	20,357	30,750	36,036							1,748		96,260
Catfish		3,077			35,190	15,347								525		54,139
Coalfish									1,771							1,771
Cultus cod							35,385	40,098								75,483
Dogfish									9,722							9,722
Flounder	2,204				14,646	962	95,896	91								113,799
Halibut	4,035		127				1,278	6,737	3,066	15,000	586,859	14,098	13,673		271,503	916,376
Hake							35,446	450	146		140					36,182
Herring			628,427		1,575		7,106	870	41,283		3,229					682,490
Kingfish							26,760	59,090			95,072	262	2,539		525	184,218
Mackerel									583		182,104				970	183,657
Mullet																
Pike				1,391	329									105		1,825
Pompano							246	1,167	117		5,797	155				7,482
Perch	1,650		8,759		948		2,630	3,537	6,326		2,370				260	26,480
Rock bass		833									64,537	12,278	161,232		34,970	273,850
Rockfish	1,660		29,934				103,437	22,602	200,770	6,805	298,891	4,886	235,152		39,509	943,646
Sole							484,835	406,287	7,972		1,969		485		225	901,773
Salmon	8,776	1,200	118	150,742	264,250	370,659	1,984	81,052	3,323,837		55			15,265		4,217,938
Smelt	11,486		8,904		2,348		125,972	10,761	35,036	16,580	39,615	2,353	5,991		340	259,386
Sea bass (white)			167					104	250	6,971	63,306	146	7,234		10,577	88,588
Sea bass (black)											5,158		7,631		3,525	16,314
Sand dab							213,084	155,600	1,296		5,357	28				375,365
Striped bass			429	32,797	88,717	61,421	84,530	222						128		268,244
Shad				86,669	2,896,418	809,125	94,147	68						10,760		3,897,187

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING JUNE 30, 1916—Continued.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Sacramento, San Joaquin	Alameda, Contra Costa	Solano, Yolo	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
Sturgeon	120			1,390	1,988	728	100							179		4,505
Sardine	45						1,198	202	231,968		17,530		136,667		145	387,755
Skate							25,927				253	75				26,285
Sculpin								70			1,029	172				1,271
Sea trout											538	10				548
Tom cod							5,118									5,118
Trout (lake)													1,610			1,610
Turbot			21													21
Whitebait		35	6,745				53,547									60,327
Yellowtail											268,076	221	27,554		8,055	303,906
Miscellaneous	5,243	400	273,450	491	275		10,431	298	6,509		22,961	14	1,235	18		321,325
Total fish	35,219	5,545	1,058,775	277,934	3,327,860	1,288,992	1,452,195	789,653	3,957,506	102,256	2,796,376	48,635	909,241	28,728	534,663	16,613,578
Crustaceans																
Crab (dozen)	2,354						6,127	6,100	968							15,549
Spiny lobster															160,535	160,535
Shrimp							99,267									99,267
Ecrevisse		1,740														1,740
Mollusks—																
Squid									59,127		5,482					64,609
Cuttlefish							237	6,102	1,522							7,861
Clam (Pismo)								3,693		41,853						45,546
Clam (cockle)		574	25,559							395	3,976	1,556				32,040
Clam (softshell)		5,382	183,460		31,801		7,144									227,787
Clam (mixed)	6,200	1,695	1,624					75	60		1,468					11,122
Oyster (shell), No.							2,474,355									2,474,355
Abalones		4,130						1,201	180,764	164,334						350,429
Mussels		85	397				367		186	1,283	5,880					8,198
California oysters			5,345													5,345

N.B.—The figures denote pounds, except where otherwise stated. Salmon, codfish, and whale products from distant waters, brought in by boats operating out of California ports, while rightly belonging to California fishing products, are not included in the table.

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING SEPTEMBER 30, 1916.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
Albacore											4,125,710	132	3,488,972			7,614,814
Anchovy			84,460				21,800		54,700		21,975					182,935
Barracuda								10		24,889	34,670	6,832	25,871		14,450	106,722
Bonito									83,521		119,621		31,116			234,258
Bocaccio							120	1,730								1,850
Bluefish																
Chilipepper								1,837	3,603							5,440
Carp				1,000		24,587	5,678							3,117		34,382
Catfish		97			7,610	1,550										9,257
Coalfish								1,660	4,545		415					6,620
Cultus cod	1,222						36,275	27,002	11,156	261	62					75,978
Dogfish			4,245								325		118			4,688
Flounder	707						72,290				405	7				73,409
Halibut	38,204		101				1,358	2,191	10,387	7,602	219,029		215		773,676	1,052,763
Hake							31,700	6,550			15,815	7,654				61,719
Herring									2,125		270					2,395
Kingfish							36,207	18,960	62,277	22	44,378	159	1,318			163,321
Mackerel									3,904	10,005	285,513	1,473	4,033			304,928
Mullet								60					205	9,202		9,467
Pike					75	736										811
Pompano							60	894	19		1,300		29			2,302
Perch		7	3,556				1,063	2,467	630		1,265	30				9,018
Rock bass										15 835	231.159	4,573	137,558			389,125
Rockfish	3,906	963	555				227,721	76,460	249,432	27,445	240,174	2,536	13,079			842,271
Sole							582,526	620,716	8,531	20	2,310		60			1,214,163
Salmon	129,553	1,849	2,806	464,038	193,003	667,682	234,727	67,169	1,255.689	80						3,016,596
Smelt	9,784	90	4,834			50	77,127	23,174	36,237	24,056	40,907	9,050	8,925			234,234
Sea bass (white)			18,941			635	96,700		30,153	5,896	80,358	96	1,391		218,797	452,966
Sea bass (black)											5,746		20,349			26,095
Sand dab							228,030	209,940	8,060	4,680	5,823	597				547,130
Striped bass		1,798	52	8,641	1,318	37,484	91,197	106						196		140,792
Shad				6,580	12,780	51,980	2,760	28						1,393		75,521
Sturgeon	525				171	650	278									1,624

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING SEPTEMBER 30, 1916—Continued.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
Sardine			5,153				2,010	16,349	3,757,686	1,265	18,675		4,868			3,806,006
Skate							14,130									14,130
Sculpin											737					737
Sea trout											634					634
Tom cod							12,937									12,937
Trout (lake)														67,273		67,273
Turbot			409													409
Whitebait			15,196				38,759			235	182,552					236,742
Yellowtail										3,569	18,066		112,073			133,708
Miscellaneous	1,703	910	32,945	175	18		17,506		3,444			198	1,144	20		58,063
Total fish	185,604	5,714	173,233	480,434	214,975	785,354	1,832,959	1,167,303	5,586,099	125,860	5,697,894	33,337	3,841,324	81,200	1,006,923	21,278,689
Crustaceans—																
Crab (dozen)	547	6					2,291	763								3,609
Spiny lobster															121,265	121,265
Shrimp							127,927									127,927
Ecrevisse		492														492
Mollusks—																
Squid			125				108	225	109,956		105					110,519
Cuttlefish							2,713	134	121							2,968
Clam (Pismo)										51,671						51,671
Clam (cockle)		460	15,589								7,102					18,151
Clam (softshell)		2,020	49,703			43,973		5,855								101,551
Clam (mixed)	6,040	560	2,500			106	1,350			50						10,606
Oyster (shell), No.							3,284,345									3,284,345
Abalones								500	187,634	1,392						189,526
Mussels		310	165				4,409			1,242	7,120					13,246
California oysters			6,004													6,004

N.B.—The figures denote pounds, except where otherwise stated. Salmon, codfish, and whale products from distant waters, brought in by boats operating out of California ports, while rightly belonging to California fishing products, are not included in the table.

VIOLATIONS OF THE FISH AND GAME LAWS.

September 1, 1916, to November 30, 1916.

Offense	Number of arrests	Fines imposed
Game.		
Hunting without licenses	39	$555 00
Deer, close season—killing or possession; excess bag limit one season	17	365 00
Female deer, spiked bucks, killing or possession; not retaining horns of deer; illegal deer hides	13	550 00
Nongame birds, killing or possession	17	185 00
Ducks, close season—killing or possession; excess bag limit	23	1,125 00
Shooting ducks from power boat in motion	9	75 00
Using a live or imitation animal blind	5	125 00
Night shooting	12	215 00
Geese, excess bag limit	1	
Grouse, close season—killing or possession	1	40 00
Shore birds, close season—killing or possession; offering for sale	15	215 00
Quail, close season—killing or possession; excess bag limit, trapping without permit, shipping in concealed package	5	175 00
Cottontails, close season—killing or possession	2	50 00
Total game violations	159	$3,675 00
Fish.		
Angling without a license	7	$125 00
Fishing for profit without a license	18	175 00
Striped bass—underweight	5	145 00
Dried California shrimp in possession	1	
Illegal fishing apparatus	9	20 00
Spot-fin croakers, buying and selling	2	40 00
Trout, excess limit, undersized offered for sale	3	25 00
Catfish, undersized offered for sale	1	12 00
Young of fish, taking or possession	3	20 00
Crabs, close season—taking or possession	4	25 00
Clams, undersize	1	25 00
Abalones, undersize	3	40 00
Lobsters, undersize and oversize	5	90 00
Taking fish within 50 feet of fishway	1	
Total fish violations	63	$742 00
Grand total fish and game violations	222	$4,417 00

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

September 1, 1916, to November 30, 1916.

Game.	
Deer meat	333½ pounds
Hides	9
Ducks	4,278
Geese	1,158
Quail	173
Doves	8
Shore birds	6
Nongame birds	5
Rabbits	26
Fish.	
Striped bass	525¼ pounds
Trout	48½ pounds
Dried California shrimp	4,160 pounds
Spot-fin croakers	1,435 pounds
Crabs	632
Clams	100
Lobsters	55
Abalones	33
Miscellaneous fish	8¼ pounds
Illegal nets	10
Searches.	
Illegal fish and game	111

STATEMENT OF EXPENDITURES FOR THE MONTHS OF JULY, AUGUST AND SEPTEMBER, 1916.

General administration	July	August	September
General Administration—			
General administration	$1,884 44	$2,111 26	$2,398 78
Research, publicity and education	194 70	376 71	219 59
Printing	178 01	731 73	379 47
Fish exhibits	219 10	235 00	679 21
Game exhibits		12 90	165 11
Game farm	279 36	385 31	199 02
Mountain lion bounties	180 00	320 00	280 00
Lithographing hunting licenses		21 00	
Lithographing anglers' licenses			7 50
Hunting license commissions and refunds	1,101 80	522 00	2,451 00
Angler's license commissions and refunds	1,631 70	348 20	1,028 90
Market fishing license commissions and refds.	33 50	59 00	23 50
	$5,702 61	$5,123 11	$7,832 08
Patrol—			
San Francisco District	$5,558 33	$5,739 59	$5,718 82
Sacramento District	4,611 98	4,098 96	3,652 76
Los Angeles District	1,867 80	1,870 40	2,113 86
Launch patrol	817 35	824 67	980 01
Prosecutions—fish and game	129 47	93 80	71 70
Crawfish inspection	100 00	100 00	100 00
Winter game feeding			
Accident and death claims		7 00	
	$13,084 93	$12,734 42	$12,637 15
Department of Fish-culture—			
Hatchery administration	$919 27	$799 50	$785 76
Mount Shasta Hatchery	2,407 03	2,375 70	3,253 72
Mount Shasta Auxiliary Stations			29 05
Mount Whitney Hatchery	1,110 11	283 67	224 01
Mount Whitney Auxiliary Stations	186 85	503 27	643 50
Tahoe Hatcheries	374 74	396 19	256 16
Tahoe Hatcheries Auxiliary Stations			
Marlett-Carson Hatchery	31 40	52 73	9 20
Fort Seward Hatchery	490 96	520 33	474 52
Ukiah Hatchery	175 43		
Snow Mountain Station		26 69	99 40
Brookdale Hatchery	249 21	25 39	
Scotts Creek Station	31 00	31 00	30 00
Almanor Station	149 74	167 77	805 24
Bear Valley Hatchery	177 75	250 00	69 87
Yuba City Shad Station		986 35	5 00
Fish distribution	2,916 90	1,410 38	1,431 54
Fish transplanting	182 19	397 10	229 50
Screen, fishway, water pollution	654 88	610 82	536 75
	$10,057 46	$8,836 89	$8,883 22
Commercial Fisheries, Research and Patrol—			
Fishery research and patrol	$509 63	$433 75	$378 92
Grand totals	$29,354 63	$27,128 17	$29,731 37

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IN MEMORIAM.

JOHN PETER FISHER.

John Peter Fisher, game expert of the California Fish and Game Commission, with headquarters in San Francisco, dropped dead while hunting in the marshes near Los Banos, on Sunday, November 26, 1916. Apparently there was no presentiment of death, as he left home in his usual health and was as cheerful and jocular as ever.

Mr. Fisher was a native of San Francisco, being of a pioneer family. His father came to California in 1848, and settled in El Dorado County in the early sixties. Mr. John P. Fisher married Miss Summerfield of El Dorado County, and two children were born to them: a daughter, who died when quite young, and a son, whose tragic death by accidental shooting occurred when the young man was but eighteen years of age.

John P. Fisher was a lover of nature. He knew the woods, the birds, and the animal life of northern California as thoroughly as few men have come to know them. He was an exceptionally well-informed man. Always reading, observing and studying, he was able to thoroughly discuss a wide range of subjects. He held many positions of trust, where an expert knowledge of men and conditions was essential. For many years he was connected with the timber interests of El Dorado and adjoining counties, and the people of El Dorado County twice elected him to the position of county clerk. He was prominent as a national guardsman, and as such was recognized as one of the best shots in the United States, his possessions including many medals and trophies won in open competition.

He was known and loved for his genial disposition. Few men could number the sincere friendships accorded to him. No matter how he may have felt; no matter his secret troubles or sorrow, it was always a smile and a cheerful word from John P. Fisher.—W. A. Gett.

PAUL SMITH.

The following fitting words were spoken at the funeral of Paul Smith, one of the commission's trusted deputies, by Assistant Executive Officer J. S. Hunter:

"It has been my privilege to be associated for several years with the man whom we today have come to pay our last tribute of love and respect. I want to emphasize that it has been a privilege, for it is seldom that in all the multitude of people we come in contact with each day, that we find one in whom we can entrust every confidence as we could in him.

"In my association with him it was a pleasure to study the true nobleness of character, sincere integrity and high regard for duty that permeated his entire being. No duty was too severe, no task too hard; never complaining, always giving the best that was in him, his life was such that we can take from it a lesson that will make us all better men.

"To the wife and baby girl I would leave this word: Do not think of him as dead, but as one who has left all trials and troubles behind and who now rests where there are no sorrows, no partings, but, in their place, eternal peace. His memory is with you. Take consolation from the fact that his life was upright, his character sterling, his every act above reproach. He lives in your memory and in the memory of his friends and those who loved him."

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 3 SAN FRANCISCO, APRIL, 1917 Number 2

AN UNFAIR ATTITUDE ON GAME LAWS.

By Frank B. Hoffman.

I recently attended a trial held before a justice of the peace in one of our mountain districts, the defendants, three in number, being charged with a violation of the game law. As to the result of the trial in as far as it affected the defendants, I have nothing to say, but I was forcibly impressed and immeasurably shocked at the utter lack of respect shown by some of those present for the officers of the court, and the openly expressed sentiment against the arresting officials. The idea seemed to prevail, as it does in other small communities, that because of the nature of the case the proceedings were to be something on the order of a vaudeville performance, and at least 50 per cent of those in attendance showed by their attitude that they were there to contribute their share toward the entertainment. I will not dwell upon this case, except to remark that instances of this kind have a demoralizing influence upon the community in which they occur, for contempt for, and disregard of one law and its representatives, soon leads to contempt for another law and the officers appointed to enforce it.

I do not attempt a defense of the game warden, for neither he nor his position need defending, but I wish to register a vigorous protest against the unfair attitude assumed by a certain element of society toward these capable representatives of one of the greatest movements ever inaugurated for the benefit of the present and future generations. The populace turns out en masse to assist other officers in the capture of wrongdoers, and even the vile desecrator of the sacred hen roost is considered legitimate prey, all citizens, high and low, lending their best effort to aid in his apprehension. The officer who effects his capture is publicly lauded for his zeal and bravery, and where his office is elective, he is unanimously returned to office because of his record as an efficient officer. But because of some strange inconsistency in the human makeup, we place the game warden in a little niche by himself and deny him the whole-hearted support that is the due of every officer, regardless of which branch of the law he represents.

The admirable and conscientious manner in which the majority of these men perform the duties assigned to them, speaks well of their physical and moral courage, for it is a lamentable fact that in some districts the sentiment against them is so hostile that they must possess these qualities to a high degree.

Even the hardened criminal recognizes the necessity of law and order, although he may look with disfavor upon the laws which affect his particular line of endeavor, and while he will resort to any measure to avoid capture, once he realizes that resistance is useless, he submits

to arrests and entertains nothing but the friendliest feeling toward his captor. But in most cases, violators of the game law make their arrest the basis of a bitter hatred for the man who brings them to task, considering it in the light of a personal affair between themselves and the game warden, seeming to forget that he is but an instrument of society. A certain calibre of chronic offenders voice their hostile sentiments in very forceful language, endeavoring by threat and presentation of a warlike front to intimidate the resident game deputies. It is interesting to note the source from whence these threats emanate. In every case, the salient features of the physiognomy of the one who utters them proclaims the fact that his mental peregrinations do not extend beyond bounds usually referred to as "narrow."

In some districts it is a difficult matter to secure a jury who will deal fairly with the people in these "game trials," and men of high standing, who consider themselves law-abiding and upright members of their community, will resort to every subterfuge to avoid jury service in these instances. Sometimes they are moved to this as an act of business or social diplomacy or because of the fear of incurring the ill will of others. Others, who can and will qualify as jurors in the trial of any other case, seem, upon these occasions, unable to adjust their mental processes in a manner which will enable them to lay aside their personal feelings and opinions.

Citizenship carries with it certain responsibilities, which, in all fairness to ourselves and our fellow man, we must not shirk. I consider jury service one of the most solemn and high duties we are called upon to perform, and while it is, at best, a disagreeable duty, we can not deliberately avoid it without feeling that we are shirkers. It is discouraging to the game wardens, when, after the conscientious performance of their duty, they are denied support from the quarter from which they naturally expect it. I refer particularly to the lack of cooperation in some districts upon the part of the district attorney and other county officials. However, if I am correctly informed, it is possible to proceed with the prosecution of a case without the assistance of these officers, and I believe it would be an excellent thing could these trials be held before any justice of the peace in the county, when, owing to the strong sentiment against game protection, it is impossible to secure a fair-minded jury in the locality where the offense is committed.

Our game is one of our most valuable assets. It is the means of bringing to our state thousands of dollars annually which otherwise would go to states more favored in the line of game, and laying aside all other considerations, from this standpoint alone it is to the interest of every man and woman within the boundaries of our state to lend their hearty support to any movement that has for its objective the preservation of our game. Society has appointed representatives to enact its laws, and as long as these enactments remain upon the statute books they must be observed and upheld by all, and the ones who are delegated to enforce them, instead of being anathematized and condemned, should receive the moral and active backing of every citizen.

Every true sportsman should cultivate the acquaintance of the local representative of the Fish and Game Commission in the district where he usually hunts or spends his vacation. He will find the deputy a good man to know. As a general rule he is a veritable encyclopedia of

information pertaining to things that are of interest to all lovers of the great out-of-doors. He can tell one where the best hunting and fishing is to be had; point out the best camp ground, and be useful in innumerable small ways that I am sure will be highly appreciated.

I hope to see the day in the not distant future when the true status of our game wardens will be firmly established in the public mind, and the warden will be accorded the respect to which the dignity of his office entitles him.

Meet him on the open ground of good fellowship; extend to him the hand of welcome when he favors your camp with a visit, and as he is usually the possessor of a pleasing personality, he will, if afforded an opportunity, win your good will and friendship.

STRIPED BASS FISHING.

By C. M. Boutan.

My first experience angling for striped bass was sixteen years ago. After several fishing trips to San Leandro Bay, where I caught nothing but sting-rays, I succeeded in hooking a two-pound bass in San Pablo marsh near where the city of Richmond now stands.

The clam was the only bait used at that time. The preparation of a clam for a bait consisted in taking it out of the shell and splitting the neck lengthwise, the idea being to make a pocket of the neck, for the clam belly is soft and comes off the hook easily when cast. The hook was run through the little hard teat on the belly, then through the belly and twice through the neck lengthwise.

Our fishing was confined to the sloughs and good catches on some occasions were made.

In July, 1901, Al. Wilson perfected a bass spoon which he brought to San Pablo to try, and it was my good fortune to be there fishing at the time and to see the results. Mr. Wilson informed me that the spoons would be on the market shortly, and upon securing one I made a hasty trip to try it out. Large numbers of bass were occasionally caught with this spoon, both in the sloughs and on flats outside in San Pablo Bay. But the striped bass is a queer fish and on some days it would not strike the spoon. The fish were small, ranging from one to four pounds, but occasionally a larger one was landed.

A couple of years later some men tried trolling for bass in Raccoon Straits and secured a nice catch, so several of us went over to try our luck. Fishing was so good that we formed a club known as the "Pacific Striped Bass Club" and purchased an ark, which we still maintain at Belvedere. There were two distinct runs of bass in that neighborhood, one in March and April, the other in September and October. Seldom was a fish caught under five pounds and from that up to fourteen pounds, with a few as large as twenty pounds. Two men generally fished together, using the "armstrong" motor. Rod holders were clamped to the sides of the boat to hold the rods. It was ideal fishing, with plenty of excitement, especially when two fish were hooked at the same time, which often happened. The fishing was mostly done close to the rocks.

A good many bass were being taken in San Antonio Slough in Marin County at this time on bait, but I made only a few trips up there, with poor results, although I have seen men returning from San Antonio with all the bass they could carry.

Five years ago it was found that the small crabs of the species *Cancer magister* were fine bait. The water in Carquinez Straits and Petaluma Slough and at Benicia and South Vallejo was alive with them. Where they were present, a clam used as bait would not last a half minute. A man who had used crabs for bait in the East showed us how to prepare them. Break off all the legs, cut the edge of the shell all around and lift off the back, then break off the two lower parts of the shell and you have one of the best striped bass baits. A large hook, seven or eight 0, is used and the bait is put on whole. When bass are taking crabs well they seemingly taste the bait first, then grab it and run.

A 35-pound striped bass that it was my good fortune to catch in Petaluma Slough had in its stomach a crab about five inches across the back. At another time a 12-pound bass was found to have devoured thirteen small mud crabs, called "fiddlers."

An arrest was made for having small *Cancer magister* crabs in possession, which put a stop to their use for bait. They are a real nuisance when fishing with other bait and the few that would be used would be nothing to the numbers that die each year when the freshets come down the sloughs adjoining Petaluma Slough.

A large crab of lawful size can be used, but it must be fresh and uncooked. A dozen good baits can be made of it.

The salt water bullhead is the predominating bait at the present time. The head and tail are cut off and the hook, a number four or five 0, is put into the throat from the inside.

Some men strike with the line when the fish grabs the bait, while others have the clicks on the reel fixed very light so it runs easily and the fish is allowed to run with the bait from 20 to 100 feet or until it is thought he has swallowed the bait. The fish is then hooked in the stomach or throat. A fish so hooked does not put up as good a struggle, in most cases, as one hooked in the mouth.

Monterey sardines are used a good deal for bait, also herring. They are cut into chunks or split lengthwise. Fishing with herring one night in January, 1913, in Petaluma Slough, I landed 125 pounds of bass in three hours, the largest fish weighing thirty-six pounds.

During the summer months the fishing in San Pablo Bay, Napa River, Petaluma Slough and their adjoining sloughs is mostly carried on by trolling with spoons, and during that time the fish are usually small, although an occasional large one is caught. It is in winter the bass run large and they are then caught on bait.

The largest bass caught with rod and reel was caught by William West of Napa, in the Napa marshes, on a spoon September 26, 1911. Its length was 51 inches, girth 31 inches, weight 62½ pounds.

Seemingly, there are millions of striped bass in San Francisco, San Pablo and Suisun bays and the rivers and sloughs flowing into them, and with the protection that the Fish and Game Commission is giving them there is no danger of their being depleted

THE EFFECT OF POWER DEVELOPMENT ON FISHING CONDITIONS IN THE HIGH SIERRAS.

By A. D. Ferguson, Field Agent, California Fish and Game Commission.

The construction of great dams across natural streams for the purpose of diverting or storing its waters, gives rise to difficult and trying problems in the way of providing for the free movement of ascending migratory fish over or around such artificial obstructions. To devise a fishway which will enable fish to surmount a dam a hundred or more feet high is no mean engineering feat. Such problems the Fish and Game Commission must solve. It can, and does, happen, frequently, that the construction of a great impounding dam works a very decided improvement in fishing conditions. The major streams of the high Sierra Nevada mountains of central California occupy deep canyons and their tributary waters tumble more or less directly over canyon walls. The minor or tributary streams of the high Sierra region were, because of impassable falls in their lower courses, naturally devoid of fish life. Most of the feeder waters of the river systems of the vast Sierra watershed have been stocked with trout through the agency of man's enterprise, but while there are fish in the main streams and tributaries, the chief movement of fish life as between main streams and feeders is downward and not upward.

The impounding dams now in the Sierra Nevada mountains have been constructed either in connection with hydroelectric power development or as an aid to economical lumbering and are located on tributary streams high above the main rivers. In the first instance the site was chosen for the double purpose of securing a large area for the impounded flood waters and of securing a great perpendicular fall for the piped water in a short lateral distance. In the second instance, the lumberman makes his reservoir nearest his standing timber. And thus it comes about that some people seeing a high dam across a stream where fish are found above and below such dam wonder (and sometimes complain) that the Fish and Game Commission has not compelled the construction of a fishway to enable ascending migratory fish to pass over the obstruction. The unusual conditions existing in such cases minimize the necessity of aiding the fish to ascend the stream. Furthermore, the artificial lake above the dam has made room for thousands of fish where dozens could have existed before the construction

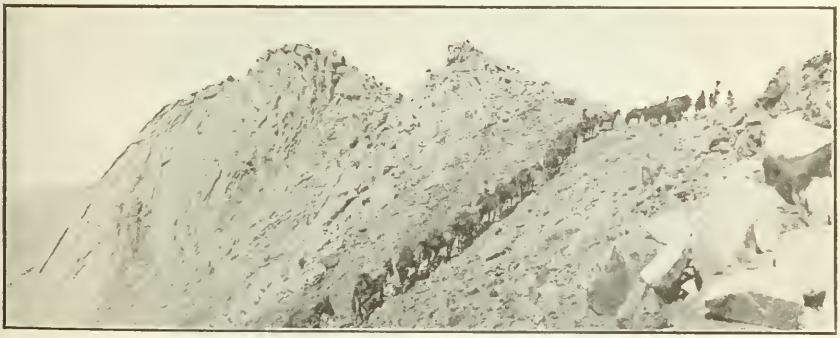

Fig. 19. Transportation by means of pack-train in the high Sierras. By using this means of transportation it is possible to plant many streams otherwise inaccessible. Photograph by A. D. Ferguson.

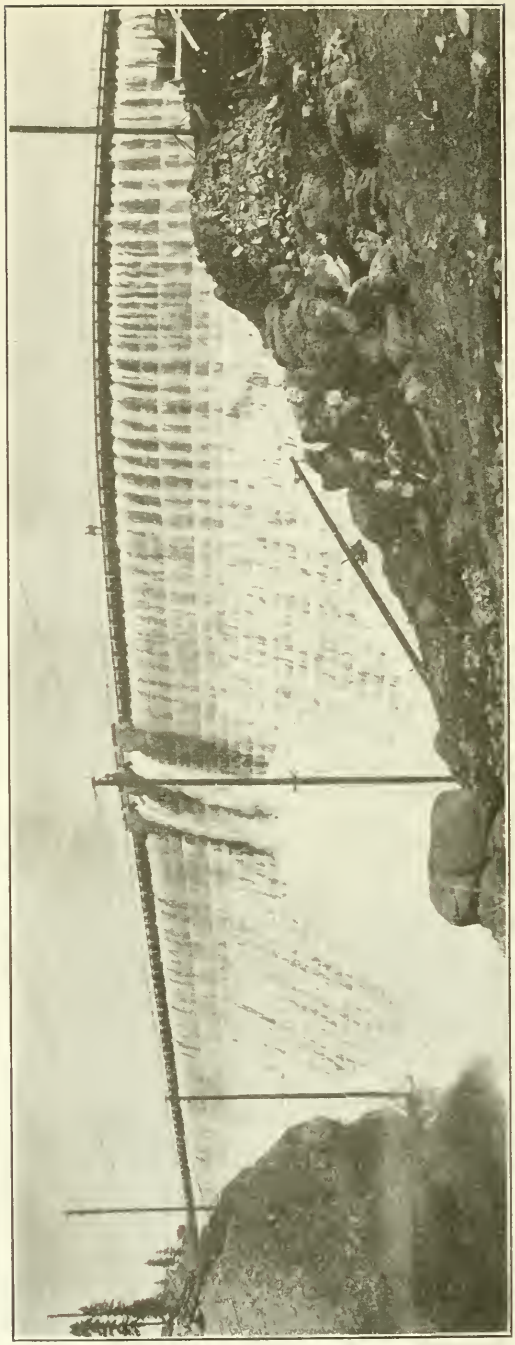

Fig. 20. Concrete dam across Big Creek Gorge in Fresno County. The water impounded forms Huntington Lake. Photograph by A. D. Ferguson.

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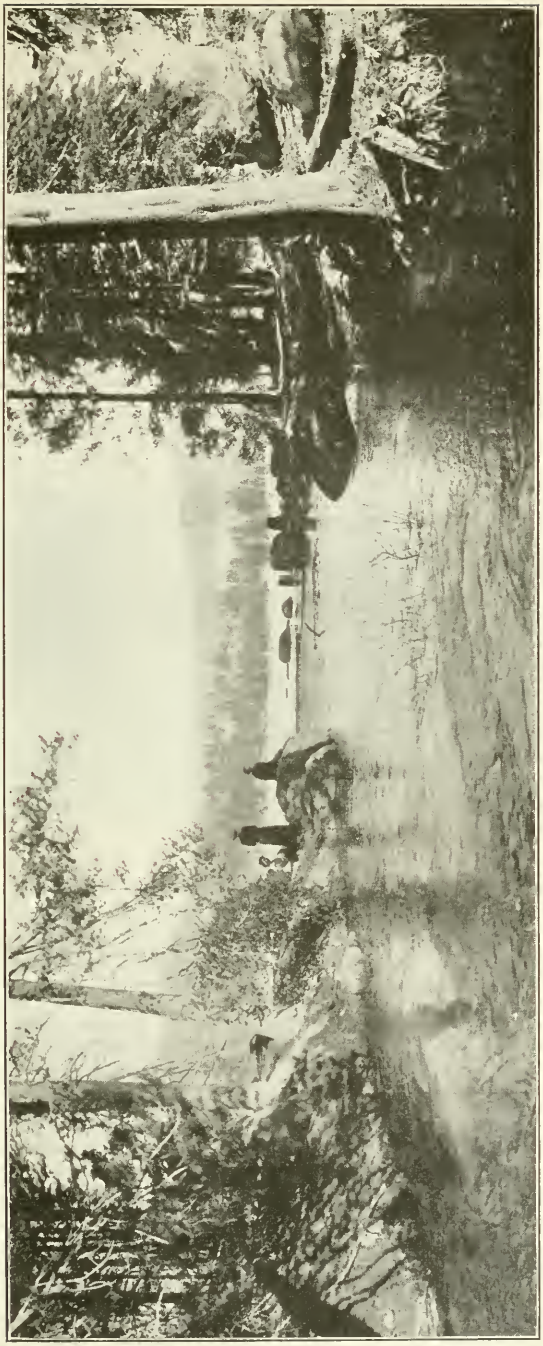

Fig. 21. A fishing scene in the Sierras. Photograph by A. D. Ferguson.

of the dam. Typical instances of how commercial enterprises have benefited a natural resource and given pleasure and profit to thousands of people, in a way their projectors never dreamed of, are to be found in eastern Madera and Fresno counties.

Before the San Joaquin Light and Power Company, taking advantage of a natural site, impounded the flood waters of the Crane Valley watershed, North Fork Creek in Madera County supported but a few trout and apparently had no future as a popular trout stream. The building of Crane Valley Dam made Bass Lake. This beautiful sheet of water, some six miles long, a half-mile wide and a hundred feet deep, is now teeming with both trout and black bass. A popular

Fig. 22. Bass Lake (Crane Valley Reservoir) in eastern Madera County. Power development was responsible for the formation of this fine body of water. Photograph by A. D. Ferguson.

summer resort is upon its banks and hundreds of campers annually visit its shores.

Stevenson Creek in Fresno County, stocked in 1888 with black-spotted trout, would never have furnished an incentive to visits by anglers, had it not been for the construction of the "Shaver" Dam by the Fresno Flume and Lumber Company. In an old-time biennial report of the (then) Fish Commission, it was stated that a careful survey showed that Stevenson Creek could never become a trout stream of consequence. Now, and for many years past, Shaver Lake, formed by the construction of a dam just above the point where Stevenson Creek starts tumbling 4,000 feet in four miles down into the San Joaquin River, is the mecca of thousands of people from the San Joaquin Valley, who, in summer, camp upon its shores and enjoy the good fishing to be had there.

The latest instance of how a high and impassable dam can sometimes prove of great benefit to the people's fishing interests is at Huntington Lake in Fresno County. Big Creek, stocked with rainbow trout in 1897, soon became a good fishing stream to the few people who in that day found its waters. In the then little known back country, its

isolation was its protection. In the year 1911, came the Pacific Light and Power Corporation, with thousands of workmen, to invade the solitudes of Big Creek Basin. At the lower end of the basin, at the head of the gorge through which Big Creek falls some 2,000 feet in a trifle over a mile, the company built a huge concrete dam. At first but 120 feet high, the dam is now being raised to a height of 150 feet. It impounds 150,000 acre-feet of water, and to the stock of rainbow trout already in the creek, the Fish and Game Commission has added several hundred thousand Loch Leven, eastern brook and rainbow fry. A mountain railway and a county wagon road permit an annual influx of several thousand people from all over the state to the shores of beautiful Huntington Lake. A fine hotel and many lesser ones are already located there. The Forest Service and the county of Fresno will jointly build a scenic road along the north shore of the lake during

Fig. 23. Huntington Lake, Fresno County, elevation 7,000 feet. Photograph by A. D. Ferguson.

the coming summer, and the playgrounds commission of the city of Fresno has selected a site on the lake shore where it is planned to give annual outings to 5,000 children.

Here, as elsewhere, the fishing is the chief lure which draws so many people to the mountains, but there is little danger of the fish supply becoming depleted; for not only will the lake support and harbor vast numbers of trout, but each spring, from out its depths, will emerge big, strong, spawning fish to ascend every tributary stream and the process of natural reproduction will go on to replenish the annual drain.

Other notable examples of the incidental (or accidental) benefits which may follow the building of high impounding dams across mountain streams, are the Highland reservoir in Calaveras County, the dam at Strawberry and the big dam at Relief, both of the latter being in Tuolumne County.

MY FIRST TRIP INTO BIG BEAR VALLEY IN THE SPRING OF 1916.

By W. C. Malone, Deputy Fish and Game Commissioner.

On the 18th day of April I received instructions from the Division Office at Los Angeles to take two men and go to Big Bear Valley to rescue the fish that were going from the lake into the mountain streams to spawn, it being stated to me that large numbers of fish in passing up the streams were becoming stranded and that they no doubt would perish unless some provision was made for getting them into deeper water.

Realizing that it was a job that would call for men who were used to roughing it and who were not afraid of cold water or hard work two men bearing the names of Dotts and Welch were secured. We got into the valley on the 20th of April, 1916, and found that the streams running into the lake were alive with trout that weighed from two to ten pounds.

The storms of the winter had filled the mouths of the streams running into the lake with sand and debris, and the large fish, in attempting to get up the streams, would get stranded in the shallow waters at the mouths, and being unable to get either up or down the streams, became easy prey to both man and beast.

We worked for the first fifteen days rescuing these fish off the sand bars and placing them back in the lake. During this time we were assisted by Mr. Phillips and Mr. Morrison of the fish hatchery at Big Bear Lake, and a Dr. Getchell, who was stopping in the valley at the time. I believe that our work saved for the people of the state of California thousands of fish that would have otherwise died, been destroyed by animals or clubbed and speared by violators.

Probably the experience at the lake this spring has been the common experience around the lake, for I have been told by old-timers of Bear Valley that they used to haul fish out by the wagonload in the spring season, and anyone who knows anything about fish when they are spawning knows that they fall an easy prey to the man who wants to pick them up, as they are at that time very tame and can be easily handled, particularly while they are stranded in the shallow waters.

During the excessive floods of 1916 the lake filled up until the water ran over the top of the dam several feet, carrying immense numbers of large trout out of the lake and into Bear Creek. After the storm was over we estimated that there were between three and five thousand fish in the creek which had been washed over the dam during this storm, each weighing between two and ten pounds. Later, when the season opened, the anglers had great sport trying to catch the large trout in Bear Creek. They used their light tackle which they had been in the habit of using for brook trout, but made very little progress in catching these big lake trout in the stream, and as one fisherman expressed himself: "When you hooked a fish he would shake his head and if he didn't break a hook, line or leader, he would brace himself against a rock, give a lunge, and away he would go!"

We had a very successful opening of the fishing season in Bear Lake this year. A great many fish were caught and some very nice ones

The only thing to mar the success of the opening was the roughness of the waters of the lake, which made it very dangerous for fishermen to go on the lake in small open boats. I did all that I could do to keep the fishermen from the more dangerous portions of the lake during that day, and persons who went on the lake in the open boats had to make shore the best way they could. A great many people do not realize their danger in going on these mountain lakes in open boats in the early part of the season. As the weather is more or less rough and the waters are extremely cold, after a person is once thrown in the water he has very little chance of getting out alive, as the experience of four men who drowned in Little Bear Lake on the opening day of the fish season in 1916 proves.

WHAT WE CAN DO TO PROMOTE FISH CONSERVATION.*

By Charles Minor Blackford, M. D.

Perhaps no country in the world possesses more societies and associations for the promotion of various ends than does the United States, and yet the small success that attends the labors of these organizations must attract the notice of anyone who looks into the matter. In every state, in many counties and in every city or large town, we find medical societies and other scientific or semiscientific bodies that are trying to teach the people at large how to better their physical condition, and yet in many cases, their influence is negligible. It was only after the brilliant object lessons given by the altered hygienic conditions in Havana and on the Canal Zone, that the mass of our intelligent people became convinced that the mosquito is anything more than a trivial nuisance and that the housefly is a menace to life, although the medical societies had been preaching these facts to unheeding ears for several years. When the truth was brought home to the people, however, they grasped the situation, and the tables of mortality already show the results of the campaign now being waged against these domestic enemies.

The reason why these bodies of learned and experienced men have so small an influence on the people around them may be summed up in the single word, ignorance. This popular ignorance and its twin offspring, prejudice and vanity, must be overcome before any marked results can be effected. Mere legislation will not accomplish much. Along our special line, the conservation of fishes, there is ample legislation—indeed in some instances there is too much—but the legislation is not accomplishing its end and we should try to find out why it is not doing so. Many of the laws on the statute books are not wise and would not accomplish anything if they were enforced, but the principal reason is lack of enforcement, and it is here that ignorance and its offspring, prejudice, come into play. One of the wisest of the writers on law has said that "He who knoweth the law and knoweth not the reason of the law, knoweth not the law; for the reason of the

*An address delivered before the American Fisheries Society, 1915. Reprinted from the Transactions American Fisheries Society, December, 1915, pp. 13–18.

law is the life of the law," and we must teach the mass of the laity the reason of the law if we wish to put life into the law and get hearty cooperation in its enforcement.

The greatest obstacle that we encounter in doing this is the vanity of the American people. For more than a century it has been a mark of so-called patriotism to claim that the resources of our country are inexhaustible, and anyone who called attention to the danger of extravagant wastefulness, was considered an hysterical alarmist or almost a traitor. In consequence of this foolish talk, we are now seeing the end of our forests, and geologists are estimating, with alarming accuracy, the length of time that will elapse before our stores of iron and coal will be exhausted. National and state governments are frantically taking steps to check the ruthless destruction of these reserves of natural wealth before it is too late, but their efforts will bear scanty fruit unless the people be shown that the wonderful wealth of our country is not limitless. When this is grasped, and not until then, conservation will become an accomplished fact.

When America was first being settled by Europeans, the abundance and variety of the fisheries of both the salt and fresh waters made a deep impression on the colonists. The Grand Banks fisheries played no small part in causing the adjacent continental shores to be colonized, and the fishes along the coasts and in the rivers supplied the colonists with a large part of their food during the earlier years of the settlements. The widespread belief that this resource was inexhaustible led to such reckless destruction that the fisheries began to decline, and about the time of the Civil War the shad catch had diminished to such an extent that its restoration was one of the main reasons for the establishment of the United States Commission of Fish and Fisheries, the predecessor of the present Bureau of Fisheries. Following the example of the national government, many of the states have established commissions charged with the duty of restoring or increasing their respective fisheries, and it is a part of the duty of our society to aid these commissions in the accomplishment of their task.

This can best be done by arousing the interest of the people in the work, and as said above, this can only be done by spreading abroad knowledge of the economic value of the fisheries and showing that in preserving them, something more is intended than merely restricting the rights of the fishermen. Our society can do good work in this direction, both as individuals and as an organization, and I want to make a few suggestions as to how we may go about it.

At the meeting of the Fourth International Fishery Congress, held in Washington in 1908, O. M. Dennis, former state game warden of Maryland, gave some reasons for the failure of fish protective legislation, and among them he placed the selfish jealousy of sportsmen and commercial fishermen in regard to bills introduced by either class. He said that this being true, "The country members of the legislature, as well as the fishermen themselves, look with suspicion on any measure presented to the legislature which has for its purpose the protection of fish and game when such measure is presented by city men." Unfortunately this is true, and it is not confined to Maryland by any means. The antagonism between country men and city men is so

widespread as to be almost universal, and among the rural population there is a general opinion that game protective laws are designed to furnish sport for city men at the expense of the rights of the country people. For this reason the game laws are very commonly looked on as something very much like acts of tyranny, and disobedience of them is regarded somewhat in the light of heroism. It should be remembered that laws are but the crystallized expression of public opinion, and if there be no public opinion favoring a law, or if public opinion be opposed to a law, merely placing a legislative act on the statute book will not produce any result. It is therefore necessary to create an enlightened public opinion in favor of laws for the conservation of fishes, and when this is done the enforcement of the laws will be both easy and effective.

Our society can aid in the development of this public opinion both as a collection of well informed individuals interested in this movement and as an organization. Our members come from many of the states of the Union, and among them are state and national officials, college professors, commercial fishermen, scientists and sportsmen; in brief, every aspect of the fishery question is represented among us. We are not sectional and we have no selfish nor class interests to serve, and consequently we are in better position to spread the knowledge of fish life among the people than would be any trade organization or even a purely scientific society. As individuals it would be well for us to write papers for the press; not merely for the big city papers, the sporting magazines and the fish trade journals, but for the country weeklies that go out among the masses of the rural population. If we were to write articles that are scientifically accurate; that are interestingly put, and above all, are not "in a tongue not understanded of the people," many of our members would be surprised to see how eagerly they will be read and what an effect they will produce. One of the main reasons that societies such as ours have so little effect on public opinion is that the subjects that we discuss and the language in which we discuss them are uninteresting and unintelligible to most of the people outside of our own narrow circle. It is hard for us, who have given much of our time and effort to the acquirement of a special line of knowledge, to appreciate that what is merely elementary to us is an unknown and fascinating world to many intelligent men outside of the ranks of professional naturalists. How many of these people could tell how a fish egg is impregnated and how it develops? How many can tell anything of the life history of even the commonest fishes? The knowledge—if indeed it can be called knowledge—that most persons have of such subjects is a mass of traditional lore, resting on misinformation as a basis, that is so far from the truth that to call a tale a "fish story" is equivalent to saying that it is false. By putting the known facts of fish life clearly and accurately before the intelligent people of our country, we would make hundreds of practical students of the natural history of fishes where none are today, and nearly every one of them would become an active aid in the conservation movement.

Another method of advancing our purpose is to have our members give talks before school children. Many, if not all, of the school superintendents will welcome the chance of having some well-informed man or woman give one or more talks—we need not dignify them by calling them lectures—before the children on this subject, and by so doing the interest of the coming generation will be aroused. The recent Boy Scout movement offers another opportunity. Teach these boys how the black bass or the brook trout spawn; if possible show them some of the eggs during their development, and the boys will become ardent protectors of the spawning fish and not destroyers of them. They will see that the despised city sportsman is a pretty decent kind of fellow after all, and they will teach their parents and their neighbors the value of fish conservation.

Finally, what can we do as a society to arouse greater interest in our avowed objects? We can take a hint from one of our sister societies, the National Geographic Society. We should remember that there is nothing in which any intelligent man is interested that may not be made an object of interest to any other intelligent man if it be properly put. We are far too prone to discuss technical matters that are of great interest to us as biologists and fish culturists, and to forget that these topics, although of great value, are of no interest to the masses unless we try to make them such. At first glance it would seem that there are few subjects less interesting than the cold, bare facts of geography, but by putting these facts attractively, the National Geographic Society has built up one of the most entertaining magazines in the country, and has enrolled a membership of thousands. We might do something of the same sort. We might try to issue a magazine of popular ichthyology that would cover the scientific, the commercial and the sporting sides of our subject, and by having the articles written simply, clearly and accurately, spread the influence of our society throughout the land. We would replace the ignorance and misinformation that now prevail by clear, concise and accurate knowledge, before which the obstinacies and prejudices that now oppose us would disappear. We would enlist thousands of eager students of all ages and sexes to battle for fish conservation, and we would make our society a power in the land. Many of our members are easy and graceful writers, and I feel certain that enough of them would be willing to contribute articles to such a journal that would make it authoritative and valuable as well as interesting and entertaining, and, should the experiment succeed, we would have the consciousness of having performed a valuable service to our country.

TRINITY NATIONAL FOREST GAME REFUGE.

By E. V. Jotter, Chief Forest Deputy.

The Trinity National Forest Game Refuge (Fish and Game District No. 26) situated to the east and south of Big Bar, Trinity County, includes approximately 65,000 acres, of which 2,377 acres are alienated land.

The area extends from the head of a little gulch on the north, at an elevation of approximately 3,500 feet across the Trinity River (elevation 1,300 feet) over Hayfork Bally Mountain (elevation 6,000 feet),

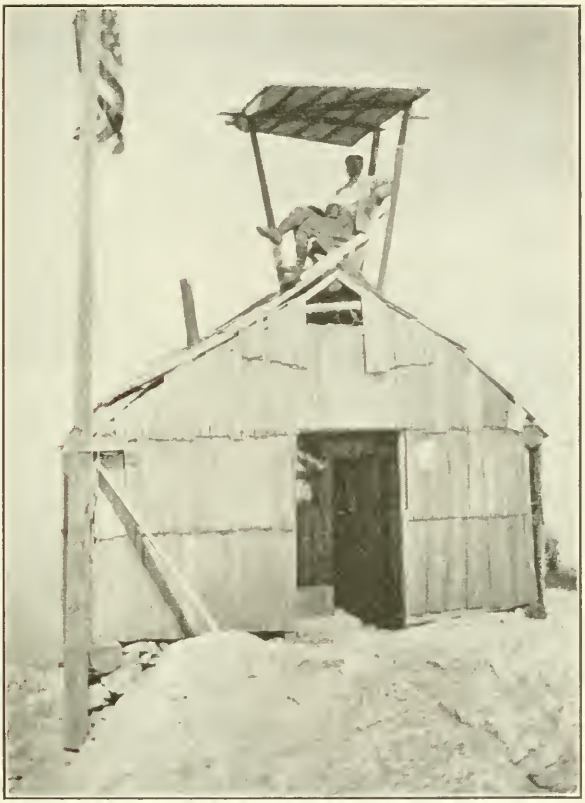

Fig. 24. Lookout on Hayfork Bally, highest point on the Trinity National Forest Game Refuge (District 26). From this section can be heard practically all gunshots within the refuge.

across Hayfork Creek (elevation 2,000 feet). This range in elevation and the south exposures afford both summer and winter range, so that game need not leave the refuge at any time. The area also includes a number of licks much frequented by deer.

An almost equal distribution of timber and brush types is to be found, the latter usually being found on the steep south or west exposures. The timber includes both fir and pine types, the latter having

the most browse and grass feed. Brushfields are largely of manzanita, white thorn, and mountain mahogany, although such browse feed as oak and blue brush is also common.

At present 365 cattle and 14 horses are grazed here by 17 permittees. Very few campers use this region solely for the camping, but in the past it was a favorite hunting ground. After the completion of the down-the-river road, there will undoubtedly be much travel through this refuge, and quite probably more camping along the road.

Deer are found throughout this area, quite generally distributed throughout the summer and fall, and living at the lower elevations during the winter and spring. It is also thought that some of the deer that winter here regularly travel out of this region during the summer and early fall. It is estimated that the average number of deer found here during the summer does not exceed 1,500 head.

Mountain lions move about a great deal, but there are very few within this area and possibly 40 to 50 bears and 150 coyotes make this region their home. Mountain and valley quail and grouse are scarce but squirrels are abundant.

As already stated, this region affords excellent summer and winter feed and because of this reason, as well as the favorable climate and low snowfall along the river, forms splendid breeding grounds. Water is abundant, salt licks are convenient, and there is plenty of early feed.

This region has always been recognized as a good hunting ground and it was so extensively visited in the past that the number of deer was being seriously reduced up to several years ago. Since game laws are being observed more generally deer are increasing. Although no unusual number of game violations have occurred in this region there have been several violations for such reasons as killing doe, more than two a year, or hunting without a license. Local hunters can still use this region with very little risk of detection, but it is not so easy for outside hunters to go alone or in a party without being apprehended. The establishment of this refuge created a safe place for breeding deer to supply a great area of surrounding country. There should be but little reason for any persons except stockmen to roam about within the refuge, and consequently there should be less danger of fire through carelessness by individuals.

The employment of a man to devote his entire time to this area would permit the close supervision necessary to keep out all but those having a legitimate reason to be in the area. Naturally there should be a good check on those who go into the refuge, so that only responsible parties who will be careful with fire, can enter.

At present the only supervision exercised is that done in a general way by Deputy Laws and whatever incidental patrol and supervision can be given him by forest officers. This refuge is fortunately located in that the district rangers at Hyampom, Hayfork and Big Bar are near the main trails of the refuge and the lookout on Hayfork Bally can hear any shots within a part of the area. However, these men exercise only incidental supervision and only two of the number are on duty all year. It would seem advisable, therefore, for an experienced man to be stationed on the refuge all year at a salary of

$100 per month (the man furnishing his own subsistenee and horse feed).

The extermination of predatory animals should fall largely to the patrolman who could kill such animals as coyotes during the summer and trap or poison them during the winter. Probably $25 a year would cover the cost of traps, ammunition, poison, bait, etc., used in this

Fig. 25. Cañon Creek Falls, Trinity County, typical of Trinity County mountain scenery.

work. A patrolman can do more to increase the deer by destroying predatory animals, especially coyotes, than in any other activity, not excepting unlawful killing of deer.

Winter feeding is sometimes necessary and would cost from $25 to $50, as we can assume that under this protection the game would increase and require more feed during periods of stress. The proper

protection of the existent species of game and bird life will be all that is necessary to fully restock this area.

Sentiment of the local public is not favorable toward this idea of a game refuge, as it is believed by most of the people that there really is not need for closing any area to legitimate hunting. They believe that all that is necessary is to exterminate the predatory animals, to enforce the game laws in general and particularly to curtail the killing of more deer than is permitted by hunters who travel by auto from county to county, killing their full quota in each.

THE CASE OF THE SPORTSMAN vs. THE CASE OF THE FARMER.

[The following contrasted opinions regarding the relation of the farmer to game are of peculiar interest. Both quotations are from Eastern men. Fortunately, California is practically free from this conflict of interests which complicates the cause of game conservation in Eastern states. Those who never carry a gun have here actively espoused the cause of game protection and are taking part in bringing about the proper kind of laws. And the sportsman is sacrificing his own immediate good for the perpetuation of the game supply. The farmer is as a rule cooperating in preserving wild life, even to the extent of artificially feeding it. Only occasionally is one found who takes the same point of view as Mr. West. The cause of game conservation demands a harmonizing of all purely individual points of view and a wider outlook which shall encompass the benefit of all—not of any single class. The sportsman and the farmer must ultimately meet on common ground and work together for a common end—a policy of conservation which shall ensure the greatest good to the greatest number.—EDITOR.]

Dr. Joseph Kalbfus, Executive Officer of the Pennsylvania Fish and Game Commission (Bull. No. 2, Pennsylvania Fish and Game Comm.), defends sportsmen thus:

"The necessity for additional protection to our wild beneficial birds is beyond question, yet, strange to say, those from whom, because of their professions, we expect the most (churchmen) and those who derive the most from the life work of birds (farmers) have up to this time done comparatively nothing for the birds.

"Fortunately for the birds, as well as for the state, there are certain people taking an interest in this matter, and strange to say, those who have up to this time done most for the birds are those who in the public mind are supposed to be bird destroyers, and known as sportsmen. In the face of this opinion, I assert without the fear of successful contradiction, that every law upon our books today giving protection to wild birds, either game or otherwise, was put there at the instance, or through the influence of sportsmen. They are the men who have said through legislative enactment that certain birds known as song and insectivorous birds, because of the value of their life work, shall not be killed at any time, and that birds known as game birds shall be killed only during certain periods and in restricted numbers, and they are the only men who have insisted upon and assisted in the enforcement of the statutory provisions relative to these subjects. They are the men who today are supplying through the Resident Hunters' License Act the sinews of war through which protection is given not only to game birds and animals but also to song and insectivorous birds, and without the help of which the labor of the farmer would, in the majority of instances, be profitless. In addition to this, they (the sportsmen) are providing the fund through which the farmer is paid a bounty for killing a weasel or other vermin that may be found destroying his poultry. They are the men who today are providing the cash to pay for grain used in feeding game and other birds during severe winter weather; in many instances they are paying for the labor necessary to place this grain where the birds may get it. Some few farmers are feeding birds during the winter time, or are at least permitting the birds, such as quail, that happen to come into their barnyard, to partake of the grain scattered for their poultry, but the great majority of farmers are not feeding or caring for the birds in any way. I have been collecting statistics regarding this matter for years, and know

whereof I speak. I have found but few farmers, who, unless they were also 'sportsmen,' when the deep snows of winter have come, will take a bag of grain on their backs and hunt up the starving quail to feed them, but upon the contrary, many farmers, in action at least, say to the quail, 'I know you are hungry and I have the grain to feed you, but if I give you that grain, worth a dollar a bushel to me, you will in all probability go over onto my neighbor's property, and he will either kill you or get the benefit of your life work, so I guess I'll stay in by the fire at home and keep my grain.' Along comes the sportsman, very likely traveling in a hired rig, who buys this very bushel of grain, feeds part of it to the birds the producer of the grain has refused or neglected to feed; part of it he feeds to birds on the neighboring farm. He keeps the birds alive, for not one would have survived the winter without his care; yet when he comes in the fall with gun and dog to take a part of what he has saved, he finds a trespass notice on almost every tree and post. The farmer who has done nothing to save the birds, in great big letters, says 'KEEP OFF,' and I wonder who will care for these birds next year."

Alfred C. West, writing in *Recreation* for September, 1915, defends the farmer's point of view thus:

"The farmer is also interested in game protection. He sees the young pheasants in his meadows. When he is near he makes a little side trip to see how they are getting along. In the old brush lot he sees an occasional rabbit scurrying down the bushy path. In the woods he watches the gray squirrels in play and their bickerings and thinks what a shame it is to kill them. He hears the quail whistling and the partridge drumming or sees the young ducks swimming around the bend of the creek and it seems good to be alive. A little later the hunting season opens but the farmer's work is pressing so that he can not get out in the woods that day. He hears the steady cannonading in woods, meadow, swamp and brush lot. He sees the automobiles rush past his place or stop in his yard, with or without a request that he care for them 'for a little while.' Perhaps a neighbor telephones in that his stock are out in the road where some party of 'sportsmen' has left a gate open or perhaps even cut his fence. It may be that a favorite cow comes to milking time, blind in one eye or bleeding all along the sides from the charge of shot of a man who may have been nervous or only drunk. A few days later he may get a few hours when he can go hunting, but everything is changed. The young pheasants are all killed. The squirrels can not be seen. Indeed, with all his exact knowledge of the habits of the game on his land he is indeed fortunate if he can get one or two shots. If he tries to protect himself under the trespass laws, he finds that the courts will not uphold him. * * *

"All this brings us to a realization that the game is decreasing largely because the farmer feels that it is not to his interest to have it do otherwise. It has already been shown how the mere presence of game is often the cause of a money loss to the farmer. * * *

"How may the game be increased? It will be evident to any one that the game of the country can not be protected if the farmers are not willing to give active assistance in enforcing the game laws and few farmers will give any active aid while they are made to feel that a reduction in the number of game animals on their lands is a distinct advantage. * * * If the farmers could have the benefit of a good trespass law and could be allowed to get profit in some way, if only by the sale of hunting permits, from the presence of game on their lands the disappearance of the game could be stopped. The present game laws seem to the farmers to have been made by and in the interest of men who want to get something for nothing and let the farmer pay for it, and until this condition is remedied laws may be piled on laws *but the game will keep on its present road to oblivion.*"

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

April 15, 1917.

THE NEW COMMISSIONER.

On December 8, 1916, Mr. Edward L. Bosqui of San Francisco was appointed fish and game commissioner to succeed Carl Westerfeld, who was elected at that time to the office of executive officer of the commission. Mr. Bosqui is a son of Edward Bosqui, a pioneer printer and publisher of San Francisco. The present commissioner, like his father, is a lover of field sports and has found recreation in fishing and hunting since his boyhood days. This long experience with the fish and game of California makes of Mr. Bosqui a most valuable ally of the men who hunt and fish and of those interested in wild life conservation. Acquainted with the out-of-doors as few men are, he brings to his new position a knowledge of conditions that is sure to count for better fish and game conservation. His slogan is: "More fish and game for all of the people."

NEW GAME LEGISLATION.

As in past years there has been much interest taken in the fish and game legislation before the present legislature. In all 60 senate bills and 106 assembly bills relative to fish and game were introduced during the month of January. Some of these bills are constructive conservation bills; others would tear down much of the protective work of past years.

Noticeable among destructive bills are those relating to the taking of protection from such nongame birds as the red-shafted flicker or "yellowhammer," the meadowlark and the blackbird, and the taking of protection from ducks and geese in certain areas where it is claimed they are causing damage to rice. Provisos in our laws already stipulate that crops may be protected from the depredations of nongame birds. At least four bills provide for extensive bounties on predatory birds and animals. One bill sets aside $80,000 for bounties, and still another, one-fourth of all hunting license fees. Any such step would be a backward step, judging from the experience of other states. The bounty system has nowhere been a success except in those rare instances where a single animal of uncommon occurrence is the one on which a bounty is paid. In almost every case where the bounty system has been tried it has resulted in fraud and misrepresentation and in an early depletion of the public treasury.

A number of bills of constructive character have been introduced by the Fish and Game Commission. Many of them are amendments to existing laws and are designed to make enforcement easier. For instance, the laws protecting beaver and sea otter have been amended to include green skins as well as the possession of the animals themselves. During the past two or three years two attempts at conviction have failed owing to the inadequacy of these two laws. Amendments have also been made to the Bowman law, so that game breeding can be

encouraged rather than discouraged. Regulations for the shipment of game so as to avoid the smuggling of game to the market by means of parcel post is another important amendment.

New laws of interest are:

The trappers' license law, designed to give a record of the fur-bearing mammals taken in the state; the taxidermist's license law, providing for the supervision of those who mount trophies of the hunt; a law prohibiting shooting from an automobile; an act providing for the revocation of licenses of convicted violators; and one providing for a closed season on the black bear.

A still more important bill is one that provides for the establishment of seventeen new game refuges to be located in national forests. With the refuges already established these new ones will complete a chain extending from the Mexican line to the Oregon line.

TWO FUNCTIONS MUST BE PERFORMED BY FISH AND GAME COMMISSION.

A study of the various state commissions and their service to the state shows that each commission has two prime functions : (1) law enforcement; (2) education and publicity. For example: The State Horticultural Commission is primarily engaged in the enforcement of the quarantine laws. In addition, it is important that this commission educate ranchers to recognize injurious insects and to furnish information as to the latest and most efficient means of protecting crops from the ravages of insects and disease. The State Board of Health is responsible for the enforcement of certain quarantine laws and other laws involving the public health. On the other hand, this same board continually carries on educational and publicity work to help the people to recognize and combat infectious disease.

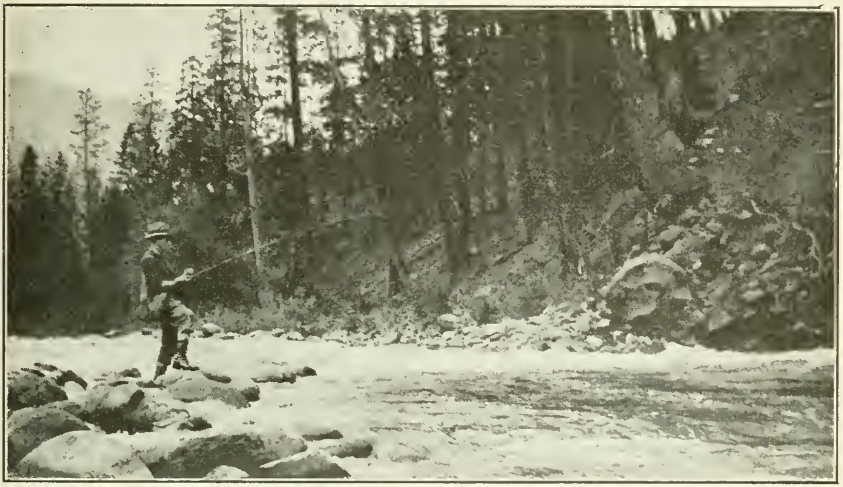

Fig. 26. Fishing on the north fork of the Feather River. Photograph by F. A. Farnum.

In a like manner, the State Fish and Game Commission is under obligation to carry on, in addition to work in law enforcement, educational and publicity work necessary to acquaint people with the fish and game laws, and to make them take sufficient interest in fish and game to properly conserve it.

The second function of a state commission is the more constructive and fundamental. Consequently it is deserving of wider attention than it has yet received.

SEVENTEEN NEW GAME REFUGES FOR CALIFORNIA.

If a measure proposed by the Fish and Game Commission is passed by the pres-

ent legislature, California will lead all the states of the Union in the number and acreage of its game refuges. It is becoming more and more apparent that one of the best means of conserving game is to establish game sanctuaries, where predatory animals are destroyed and other wild life is allowed to breed unmolested. Game increases rapidly in such sanctuaries and the increase spreads out to neighboring territory, where it furnishes food and sport to all who seek it.

With the cooperation of the United States Forest Service, seventeen areas in the Sierras and Coast Range have been selected and recommended as refuges. With the new refuges and those which have already been set aside, in addition to the several national parks, California will have a series of sanctuaries extending from the northern boundary to the Mexican line and covering in all 2,639,250 acres.

The locations of the refuges have been chosen with reference to the various kinds of game to be found, where both summer and winter range is provided and where administration will be easy. Doubtless some hunters will be inconvenienced by the establishment of these refuges in localities where they have been accustomed to hunt, but most of them realize the necessity for such conservation measures and will gladly seek other hunting grounds. The following list gives the location and area of each of the proposed refuges:

PROHIBITION OF THE SALE OF TROUT NECESSARY.

Most of the states have become convinced that commercialization means extermination, and therefore have passed laws prohibiting the sale of all game. California many years ago was driven to prohibit the sale of deer, quail and shore birds. Now necessity demands that the sale of trout be stopped.

The incentive to gain the dollar has forced the market fishermen at Lake Tahoe to deplete the supply of fish in that lake. Nor is that the only lake threatened, for the facility with which markets can be reached by means of automobiles makes the stripping of other mountain lakes more than a possibility. The angling afforded in mountain lakes should act as a lure to take people afield, where healthful recreation is possible. This can only be accomplished when undiminished sport can be obtained.

The market fishermen of Lake Tahoe are making a strong fight to defeat the nonsale of trout bill, which is before the legislature. The bill is a sane conservation measure and will deprive no one of his livelihood. These fishermen can earn a better day's wage by taking out anglers than by the sale of ten pounds of trout, a day's limit.

The sale of trout allows the millionaire to obtain these fish for his table, but the poor man can not afford such a luxury. Stop the sale and the trout of Tahoe and other mountain lakes will be

County	Location	Acres
San Diego	In vicinity of Laguna Mountain	51,840
Riverside	In vicinity of Sheep Mountain	69,120
Ventura	Near headwaters Sespe River	125,440
Santa Barbara	Near Upper Sisquoc River	39,680
Tulare and Kern	Where Kern River crosses county line	37,600
Fresno	Near forks of Kings River	33,400
Amador	In vicinity of Panther Creek	57,600
El Dorado	Near headwaters American River	64,000
Plumas	Near headwaters Feather River	31,000
Tehama	In vicinity of Mill Creek	34,400
Lassen	On northwest side Eagle Lake	47,580
Modoc	In vicinity of Pine Creek	47,560
Modoc	In vicinity of Mowitz Butte	57,000
Shasta	Near north side of county east of McCloud River	69,000
Siskiyou	On north side Klamath River	8,960
Mendocino and Lake	Near Hull Mountain	37,000
Monterey	At head of Arroyo Seco	69,000
Total number of acres		880,180

for all alike. Anyone who wishes may enjoy the angling which these lakes afford, and fishing conditions will improve rather than deteriorate, as they have the past few years.

THE SPEARING OF STEELHEAD TROUT.

The most fundamental law of fish and game conservation is the one which provides that fish and game shall be allowed to breed undisturbed. We demand that all of our best game birds and mammals be given the best of protection during the breeding season and the closed season is always made to conform to the breeding season. In spite of this situation there are a number of people in the coast counties who are demanding the right to spear steelhead trout while they are on the spawning grounds. Furthermore, they are demanding the right to fish with a gaff, thus increasing many times the destructive forces already at work. Just as people are seeking a better grade of sportsmanship by advocating the use of a fly rather than bait in capturing fish, just so the tendency should be towards the elimination of such a destructive instrument as a gaff hook. This instrument can be carried to a pool where large spawning fish are abundant and by feeling around with the end of the hook the whole pool can be stripped of its fish. This is seldom possible when a spear is used. The law as it now stands provides that the people of the counties mentioned can capture two fish a day between December 15 and February 15, a sufficient number for use as food. The demand for a more liberal law as regards the method of capture is in reality a demand for a larger catch at the time of year when fish should have total protection. Every spawning fish killed means a direct loss of thousands of young fish. Furthermore, it is always the largest and therefore the heaviest spawners that are taken by means of a spear or gaff.

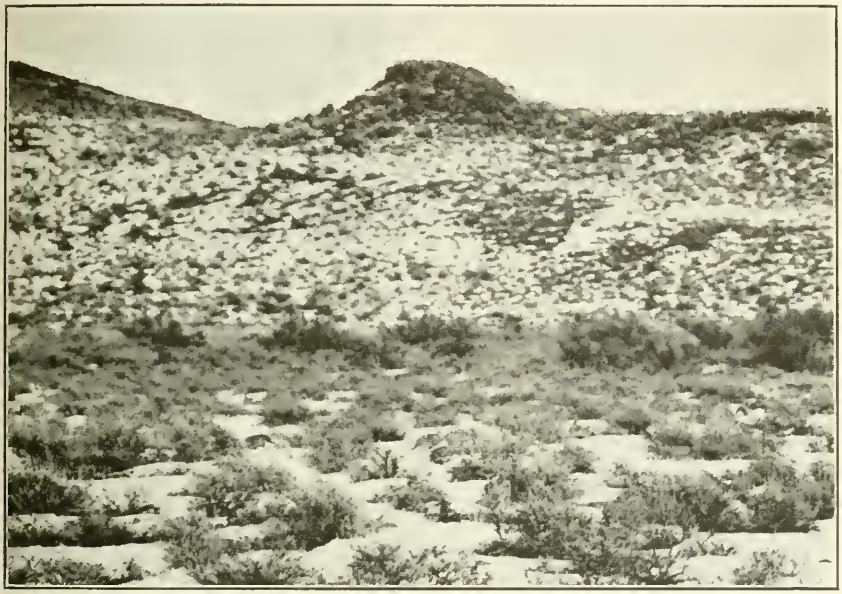

Fig. 27. Wild sage hens feeding near Straw, Modoc County. Photograph by G. Courtright.

As far as possible each section of the country should be allowed to utilize its wild life resources, but destruction of such resources can not be permitted.

It will be necessary, ultimately, to prohibit the destruction of fish during the spawning season. The move to take a larger toll of the spawning steelhead throughout the state is therefore directly contrary to natural law and a depletion of the streams is sure to follow.

Fig. 28. Lake Tahoe, home of the famous Tahoe trout. Photograph by H. A. Parker.

POWER DEVELOPMENT IN THE HIGH SIERRAS BENEFITS FISHING CONDITIONS.

In most instances the works of man have a detrimental effect on wild life. That bettered fishing conditions should go along with hydroelectric power development in the high Sierras appears unusual. Such is the case, however, as can be seen from Mr. Ferguson's article, which appears on page 55 of this number. Moreover, there are other good things which follow such development. Scenic beauties are improved by the addition of large bodies of water, and good roads make out-of-the-way places accessible. As everyone knows, development of this kind means a lessened supply of game birds and animals. It is interesting to note, therefore, that in many cases the opposite is true with fish and that, as a rule, fishing conditions are bettered rather than impaired.

THE TUOLUMNE FISH AND GAME PROTECTIVE ASSOCIATION.

We have often wondered why so few effective game protective associations exist in California. In eastern states practically every man that carries a gun is identified with the local fish and game protective association. Can it be that organizations of this type only spring up when fish and game have been nearly exterminated? Surely there is work for such organizations in states well stocked with fish and game. In fact, the object of such a society should be centered on conserving a permanent supply of fish and game rather than on the bringing back of wasted wild life resources.

We are glad to announce the formation of the Tuolumne Fish and Game Protective Association. The professed objects of this organization are the protection and perpetuation of fish and game. To gain this purpose the members will cooperate with all game wardens by reporting violations and will also willingly appear as witnesses at trials.

In a state such as California there should be hundreds of such organizations instead of less than a dozen. What a potential power lies undeveloped! How much it would mean for fish and game conservation if there were many fish and game protective associations in our state all banded together in one great organization, not with a selfish or local purpose, but with a single interest—fish and game conservation.

HEADLIGHT GLARE CAUSES DEATH OF DEER.

Orders recently were issued by the Southern Pacific to its engineers to save the lives of deer seen on the tracks at night by momentarily putting out the headlights of locomotives.

While deer are migrating from higher to lower altitudes they frequently use the railroad tracks for the journey, and if traveling at night are dazed by the headlights of approaching locomotives. Southern Pacific trains, especially in the Siskiyou mountains and in the Sierras, have struck and killed as many as a dozen deer in a single month. On looking into the glare of the headlights, the animals are confused and unable to get out of the way. On darkening the light, even for an instant, they jump to safety.

On receipt of a statement of conditions from the Fish and Game Commission orders were issued by President William Sproule and General Manager W. R. Scott that headlights are to be momentarily extinguished when deer are seen on the track, except in instances where the train is approaching a public crossing, or in any other instance where the public will be jeopardized.

A CREED OF WILD-LIFE CONSERVATION.

[The following interesting creed, to which we largely subscribe, appeared several years ago in *Outdoor World and Recreation.*]

1. The protection of all useful wild creatures and preservation of nature's resources from wanton destruction that the natural beauties of the great outdoor world may not be rendered wastes and barrens, but be preserved for the use and recreation of us and those who come after us.

2. Such restrictions upon the sale of all game or food birds as may be necessary to preserve a continental supply of such birds and prevent their extermination and secure the most practical results from their economic value.

3. A uniform system of closed season throughout the continent that will prevent the killing of all useful birds from the

first day of February in each year to the first day of September following, and such extension of special closed season as may be necessary to prevent extermination of particular species of birds.

4. Such restrictions upon the use of all sporting arms of whatever type as may be necessary to preserve a normal breeding supply of useful wild creatures.

5. A transcontinental system of game refuges and forest reserves.

6. A wise system of practical laws encouraging the breeding and sale of propagated game and food birds.

THE ENGLISH SPARROW CAMPAIGN IN REDLANDS.

The October number of CALIFORNIA FISH AND GAME made some mention of the English sparrow campaign being conducted by the city of Redlands, and a brief summary of the results of that campaign to date is therefore timely. I am indebted to Mr. I. Cushman Gray of the city clerk's office for most of the data given as evidenced by the city records.

For several years past English sparrows have apparently been gaining ground in Redlands, until last winter and spring they were becoming an alarmingly conspicuous element of what might be termed "the downtown fauna." They have been reported a number of times from the Heights and other outlying parts of the city, but I myself have seen them only in the business district and the thickly settled region immediately environing it. In my yard, a little over two miles from the heart of town, I have never seen an English sparrow during the most constant watch, though a number of the native sparrows are common enough. Downtown it has been otherwise, and an increasing feeling that municipal action was the only way to combat successfully the menace of the increasing numbers of the invading sparrow finally culminated in a resolution of the board of trustees authorizing a war of extermination. This was duly begun on July 19th. The work was placed under the direct supervision of the city marshal, and shooting was the general method employed. Several hunters were engaged in the work at a compensation paid by the city, but dependent upon the number of birds killed. This was at the rate of five cents per head until the "game" proved so scarce or hard to find that it became necessary to raise the bounty to ten cents in order to insure the completion of the work. The higher bounty has been in effect since the 6th of September. Up to the time of writing (the last of November), a total of 4,265 birds have been killed. The catch is apportioned through the respective months as follows:

July 19 to August 30	1,528
September 1 to 30	1,841
October 1 to 31	862
November	34
Total	4,265

The cost to the city is represented by the following figures:

1,729 birds at 5 cents each	$86 45
2,536 birds at 10 cents each	253 60
Total cost to city	$340 05

Judging from the reports which have come in to them, the city officials believe that the campaign has been quite thorough. But few of the sparrows are now seen in the city, and these are said to be mostly on the outskirts, though I am aware of one colony and have been told of another close to town, which are not yet entirely stamped out. Therefore the campaign is held to be practically closed.

Probably the most difficult problem connected with the execution of an anti-sparrow campaign is that of the successful eradication of the European bird without too great damage to our many useful species of native sparrows, the presence of which is so indispensable to the agriculturist, yet which so frequently suffer confusion at the hands of the layman with their undesirable foreign cousins. Concerning the success with which this difficulty was surmounted in the present instance, opinions vary. Without attempting to take a stand either way, it may be that a brief reference to the diverging views may be of value to those who are planning or have in hand a similar campaign elsewhere. The men in charge of the campaign claim that less than 1 per cent of the total birds killed were of species other than the one sought. On the other hand several citizens not connected with the hunt itself, but interested in the preservation of valuable birds equally with the destruc-

tion of noxious ones, maintain that the slaughter was less discriminating and that the English sparrows did well to comprise half of those killed during the war. According to this view, the major percentage were linnets, white-crowned sparrows, and chipping sparrows. The hunters did not encounter much difficulty in identifying the male English sparrows, but the females are much harder to tell at a little distance from other birds. Is it not the general experience that the only safe way to deal with this problem is to place the entire campaign in the hands of one who not only knows the identity and relative value of bird species, but who is thoroughly familiar with their habits and appearance in the field as well? This seems to me a vital point, so important in the broader aspects of the whole problem as to justify any extra trouble or expense which in such a campaign is at all likely to be entailed. It should always be remembered that the principal reason we have to justify the slaughter of the English sparrow is that he is an enemy of our native birds. In attempting the restoration of the faunal equilibrium, we defeat our own chief end if we inadvertently destroy the wheat with the chaff.—STILLMAN I. BERRY.

THE HUNTING ACCIDENTS OF 1916.

Pursuant to the custom, begun last year, of recording hunting accidents, we give herewith a list of such accidents for the year 1916. The compilation has been made in the hope that many observing the results of the careless handling of guns, will use more caution in the future, and so lessen accidents of this sort. It should be noted that in spite of the fact that the list is a long one, many hunting accidents occurring last year have gone unrecorded because of the lack of definite information regarding them. Furthermore, automobile accidents in which hunters were concerned are omitted.

A comparison of the report with the one made last year shows a pleasing decrease in fatal accidents in which a man was taken for game. On the other hand, there is a decided increase in the number of hunters injured or killed through the accidental discharge of a gun. Certainly, the report teaches that:

A gun must never be pulled out of a boat or under a fence barrel first.

Fig. 29. Male and female English sparrow. This introduced bird not only destroys growing crops but drives away native beneficial birds. Control campaigns have been carried on in several cities. Courtesy National Geographic Magazine.

HUNTING ACCIDENTS.

Killed.

Name	Shot by	Date	Locality	How shot
Sydney Harrington	Antone Pelascini	Aug. 5, 1916	Bolinas	While hunting deer.
Thomas B. Patterson	Fred Hoffman*	Sept. 27, 1916	Big Bar, Trinity Co.	Mistaken for deer.
Chas. A. Ludekins	Alex Adams	Feb. —, 1916	Pine Grove	

*Committed suicide afterwards.

Wounded.

	Companion	Sept. 31, 1916	Mt. Meadows, Lassen Co.	While shooting at deer.
Joe Healy (16 years)	Companion	Nov. —, 1916	Sacramento	On hunting expedition.
Fletcher Pattison	Companion	Oct. 18, 1916	San Diego	While trying to shoot ducks.
Julius Pullen (11 years)		Aug. 24, 1916	Eureka	Taken for deer.
Carl Morabe	Ed Shealor	Sept. —, 1916	Silver Lake	
Frank Warnekros	Companion	Sept. —, 1916	Fresno	Shooting doves.
Wm. Fowler	Companion	Dec. 12, 1916	Newman	Hunting quail.
Clarence Viethees (16 yrs.)	George Hogan	July 10, 1916	Petaluma	Hunting. Died.
Robert Davis	Companion	Oct. —, 1916	Yolo County	Hunting quail.
Wm. Hardester (17 years)	Companion	April 24, 1916	Lake County	Mistaken for game.
H. C. Hinckley	Companion	Nov. 19, 1916	Yolo County	Hunting ducks.
Louis Unselt	Two hunters	Aug. 3, 1916	Ukiah	Mistaken for deer.
Justin Bordenave	Harry Nice	Dec. 10, 1916	Oakland	Shooting ducks.
John Crumley	Unknown hunter	Aug. 30, 1916	Sonora	Working in woods.
Carl Armstrong	Willie Collier	Oct. 26, 1916	Oakland	Hunting ducks.

Shot by Accidentally Discharged Gun.

Name	Locality	How shot
Seally	Napa	Crawling through fence. Arm shot off. Died from loss of blood.
Ray Baugh	Monterey	Shot in arm while hunting ducks.
Frank Kelsey	Monterey	Shot in leg while hunting deer.
Thomas Jensen	Salinas	Shot while hunting quail.
Lawrence Beevers	Salinas	Shot in thumb while hunting quail.
William Irvine	Salinas	Shot in head while hunting ducks.
——— Austin	Broderick	Shot in hand while hunting ducks.
Henry Lempuhl	El Cajon	Killed by discharge of gun being taken from auto.
Leslie Smallfield	Angels Camp	Shot in thigh while hunting; died of blood poisoning.
Tony Navas	Murphys	Shot in foot.
Edward Kelly	Marin County	Shot in arm pulling gun through fence.
Harold McKay Noble	Dorris	Killed while creeping up on ducks.
H. C. Hinckley	Knights Landing	Shot in eye.
Albert J. Richards (19 years)	Cazadero	Shot in leg. Died.
Walter B. Lander (23 years)	Guerneville	Shot in head. Died.
Joseph Demenzet (25 years)	Sonoma County	Shot in chest. Died.
Alfred Hillyer (20 years)	Reclamation	Shot in groin. Died.
Russell Martin (16 years)	Skaggs Springs	Shot in foot.
Bernard Schoenings	Petaluma	Shot in legs.
Jack Dron (14 years)	Sacramento	Shot in foot.
Albert Richards (26 years)	Santa Rosa	Shot in leg. Died from loss of blood.
Jules Batka	Chico	Shot in arm on stumbling.
Frank Buchalla	Melones, Tuolumne Co.	Companion tripped and fell, discharging gun.
John Kelly (18 years)	Las Gallinas	Shot in arm while pulling gun from boat.
Chas. A. Sullivan	Cupertino	Shot in arm.
Sherwood Moran	Stockton	Shot in hand.
Clarence Smith (16 years)	Seaside	Shot in hand while hunting ducks.
Ralph Thomson	Salinas	Shot in face while crawling through barbed wire fence.
Leland Paul	Pacific Grove	Shot in hand when attempting to remove mud from gun.
Wm. R. Lansdale	Anderson	Shot in left leg.
Paul J. Maguire	Los Angeles	Fatally shot by accidental discharge of gun in hands of companion.

MAPS FOR YOUR SUMMER VACATION.

The government wisely provides help for those who seek it. The agriculturist is furnished with information as to methods of growing larger and better crops. The mariner is furnished with information as to weather conditions. Even the summer vacationist has at his command information on the locality chosen for a summer camp. The quadrangle maps issued by the United States Geological Survey are almost indispensable to the person who desires information on the contour of the country and the location of points of interest. By the use of these maps the average camper can tell with fair certainty just where he is. These maps are available at cost price and can be obtained either in Washington or in nearly all the large cities. Most of California has been thus mapped, but there are many other states that are not so fortunate. The present movement to expedite the completion of the topographical maps of the United States is therefore commendable. Those sufficiently interested should bring pressure to bear upon the authorities in Washington, D. C., that more of these important maps may be made available to the people.

Attention is called also to the excellent recreation maps furnished by the United States Forest Service. These maps give dependable guidance regarding trails, roads, streams, settlements, etc., of each national forest, together with a description of the resources of the forest.

SALISBURY FISH AND GAME FILMS NOW AVAILABLE.

The Fish and Game Commission is now in possession of a set of the famous Salisbury Fish and Game Pictures. The six thousand feet of film depicts the fish cultural work of the commission, showing the operations from the taking of the eggs to the planting of the young fish in the streams, illustrates the life history of many birds and animals and vividly portrays many of the fundamental aspects of wild life conservation. Schools, sportsmen's clubs and other organizations desiring to have these films shown under their auspices should write the Bureau of Education, Publicity, and Research, Museum of Vertebrate Zoology, Berkeley, California.

NATURE STUDY IN LOS ANGELES PUBLIC SCHOOLS.

Under the direction of Dr. Charles Lincoln Edwards, nature study has become an important part of the curriculum of the Los Angeles public schools. The whole system of nature study is built up on the theory that children should not be told the things which they can find out for themselves and that nature play, rather than nature study, is the key to a wonderful fairyland of which the child is a part. Without formal lessons and examinations and stimulated only by the spirit of play, the child may get an understanding of the other animals that live in the world about him.

According to Dr. Edwards ("Nature Play" in *Popular Science Monthly*, April, 1914) : "Nature play is the true basis for all knowledge. Through this dominant interest the child is led to know of the living things about him. Not merely are the facts of nature important, but much more valuable is the fascinating story of how and why these facts came to be. It is of much import to learn that the animals which bear scales and those covered with feathers, or fur, are all wearing similar clothing, but of the different fashions best suited to their needs. It is still more significant to realize that fundamentally the minds of all animals are as allied as are their digestive and respiratory systems. The great end of nature play for the child is not simply to learn of the rest of nature, but better to know himself as a part of nature."

In the Los Angeles system the field trip is given rightly an important place. Knowledge of the birds and animals about us is acquired best through a first-hand acquaintance rather than through the medium of a picture or a written description. The whole educational system should be more closely associated with natural objects seen out of doors. It is to be hoped that many other cities of the state will inaugurate nature study field trips. When nature study is more widely taught in our public schools the principles of wild life conservation will become so imbedded in future generations that there will be no lack of champions of the conservation cause.

FUR FARMING IN BRITISH COLUMBIA.

That fur farming is becoming a well established industry in British Columbia is evidenced by the following, which appeared in the eleventh report of the provincial game warden, 1915:

The reports received from the fox-farming companies that are operating in this province have been extremely satisfactory, some of the operators having gone to a great deal of trouble in giving a lot of information as to their methods. A most comprehensive report of the operations of the companies at Telegraph Creek was also received from the government agent of that district. Great pains were evidently taken in getting up this report, and it is most valuable, as it gave most detailed information on everything that could possibly be of interest. It is hoped that before long it will be possible to embody this and the other reports into an article that will be of use to those who are either engaged or about to engage in the industry.

Until this year no records were received at this office of any foxes bred in captivity, but this year eleven different farms have sent in such records. In all, fifty-six foxes were bred this year, and, as far as is known, these are all still alive. In addition, one or two litters of red foxes were born, but destroyed as not being worth raising. The company operating at Bella Coola reports that several litters were born, but that heavy blasting on a road close to the farm caused the parent foxes to destroy all their young. The Telegraph Creek companies had no success at all; most pups born were killed by their parents; one litter that might have been raised was destroyed, as they were only of the red variety.

The most successful operators were those located at Atlin, Pouce Coupe, and Francois Lake.

There was a fairly heavy loss of foxes during the year; some escaped from the pens, others got killed in fighting, but the principal loss was through "worms." All such losses can easily be done away with if the foxes are in the hands of a man who has requisite knowledge of his work.

The recent collapse of the boom in fox-farm shares will eventually result in just as much good as the collapse of the real estate boom. The industry will now come down to a proper business footing. Prices of live foxes having fallen, nothing like the capital hitherto required will be necessary, and many people will go into it on a small basis who were not able to do so before, and it is the small operators that are likely to meet with the most success.

Even with the price of fox pelts 50 per cent lower than it is at present, a good profit could be made in breeding foxes, as it costs very little more to raise foxes on a small scale than it does to raise small dogs. There is no reason why all the farmers' sons should not have a pair or two as pets, in the same way that boys in England keep rabbits, pigeons, etc., and often make good profits. It is likely that far more money would be brought into the country in this way than by a few big companies.

Every encouragement should therefore be given to those living in the country to make a start. It would be best to begin with red foxes, which are easily obtained and of little value.

THE CONSERVATION OF NATIVE FAUNA.

The October number of *The Scientific Monthly* contains an interesting article entitled "The conservation of native fauna," by Walter P. Taylor of the Museum of Vertebrate Zoology, University of California.

Dr. Taylor traces the history of the gradual reduction in numbers of all of the larger game mammals of California from the time when, in the early history of this state, they were abundant, down to their present depleted state, which in at least two cases, the grizzly bear and the sea elephant, amounts to total extinction.

The mammals whose histories are given are the otter, the beaver, the sea elephant, the sea otter, the deer, both black-tailed and mule, the Roosevelt and valley elk, the mountain and desert sheep, the prong-horned antelope, the black bear and the six different species of grizzly bear.

Some very interesting data are given regarding the traffic in furs in the early history of California, when large numbers of skins were exported. The increased scarcity of sea otter skins is indicated by the increase of price, which in 1880 was $80 and in 1910 was $1,703.33. Elk and deer were so abundant in early days that three thousand were exported from San Francisco in 1842, at prices ranging from fifty cents to a dollar per head.

The grizzly bear, once so distinctly a part of California as to suggest the name "Bear State," and to become the totem on the first flag of California, has disappeared completely. The last known survivor of the largest species, found in southern California, was killed in the Santa Ana Mountains in August, 1900 or 1901.

The concluding paragraphs of Dr. Taylor's paper point out the fact that not

only California, but the whole world, has been wasteful of its wild life resources for the last fifty years, and that it is vitally important that the people everywhere understand the urgent necessity for conservation measures even more rigid than those already in force, in order that California may regain, in part, what her people have been so prodigally wasting for so many years. On the biologist is laid the role of leadership in the campaign for the preservation of native fauna and on him must blame for ignorant and destructive popular action, legislative or otherwise, inevitably fall.—PHILIP JANNEY.

THE NATURAL ENEMIES OF BIRDS.

In order to exhibit the utility of native natural enemies of birds and to show the misfortunes that might follow their extermination, as well as to set forth the conditions under which they might need restraint, and to point out those exceptions that are believed to be most destructive, a bulletin has been issued by the State Board of Agriculture of Massachusetts. This paper, in the Economic Biology series, bulletin No. 3, is entitled "The natural enemies of birds," and is by Edward Howe Forbush, State Ornithologist. Fifty-eight pages are utilized in treating of the natural enemies of animals, in pointing out the useful and the harmful species and the means to be taken to control those which are harmful. This is followed by more detailed accounts of the introduction of domestic enemies, such as the cat and dog, rat and such feral enemies as foxes, minks, weasels, skunks, shrikes, bluejays, hawks and owls, snakes, frogs and insects. The bulletin is illustrated with six plates and a number of figures showing the comparative amounts of the different food items taken by different natural enemies.

As controllers of life, natural enemies have an important place in the economy of nature. It is well known to naturalists that in a state of nature the natural enemies of any species are as essential to its welfare as are food, water, air and sunlight. Unthinking people are slow to realize this, as they see only the apparent harm done by the so-called rapacious creatures, and fail to observe and reason far enough to perceive the benefits that such creatures confer upon the species on which they prey.

Insect-eating, fish-eating and flesh-eating animals are essential in the great scheme of nature, as they serve to check the increase and regulate the numbers of other species, which in turn, when so regulated, tend to perform a similar office for vegetation. Thus these predatory creatures may be regarded among the chief controllers of life upon this planet. Man, the savage, of course must be included among them, and civilized man, if guided by reason and wisdom rather than greed or folly, may exercise a beneficial control over many of the lower animals.

Among the menaces pointed out in the methods of controlling natural enemies is the introduction of foreign species which tend to destroy the balance of nature, and the bounty system, which, with few exceptions, has proved a failure. Bounty laws tend to encourage the use of guns in the fields at all seasons of the year and they continually encourage fraud. As evidence of the fraud which is sure to appear Mr. Forbush quotes Dr. Jos. Kalbfus, secretary of the game commission of Pennsylvania, as saying that many men are willing to commit perjury for a dollar. One man claimed to have killed 102 goshawks in four days in July, when this bird is only found in Pennsylvania in autumn, winter or early spring. Many frauds such as this have been perpetrated in the state of Pennsylvania since the bounty system took effect.

In recapitulating, it may be said that this bulletin shows that (1) natural enemies of birds are necessary and desirable, as they tend to maintain within proper bounds the numbers of the species on which they prey; (2) organized attempts to increase the numbers of birds over large areas by destroying indiscriminately all natural enemies are undesirable; (3) under certain circumstances enemies which have been able to adapt themselves to man and his works and have become unduly numerous may require reduction in numbers; (4) individuals of useful species which may become particularly destructive should be eliminated; (5) self-interest on the part of the people most concerned eventually will bring about such reduction of predatory animals as is needed without the stimulus

of bounty laws, which in most cases are pernicious and which if enacted at all should be directed only against the larger predatory animals or those which are dangerous to human life or exceedingly destructive to domestic animals or crops.

LAWS RELATING TO FUR-BEARING ANIMALS, 1916.

Pursuant to custom, started several years ago, the Bureau of Biological Survey has issued a bulletin entitled "Laws relating to fur-bearing animals, 1916," which has been issued as Farmers Bulletin 783. This report is a summary of the laws in the United States and Canada relating to trapping, protection, propagation and bounties of fur-bearing animals.

The introduction is of particular interest: "The value of the raw fur production of the United States and Canada has grown enormously in spite of the steadily diminishing supply of animals that furnish the finer pelts. In 1915 trappers of North America earned by their industry probably not less than $20,000,000, a remarkable sum when it is remembered that exports of raw furs were only about half the normal proportions. Conditions of the trapping industry have been greatly improved in recent years by legislation protecting fur animals in much of the territory where the business is important. As with game laws, each year brings changes in the trapping regulations, and it becomes important that the rights and privileges of trappers, as well as the limitations placed on their calling, be made plain. The present bulletin is designed for this purpose. It gives a brief review of changes made by legislative enactments of the past year, a summary of trapping regulations now in force, followed by short statements of the open seasons for taking furs, provisions relating to propagation of fur animals, and bounties offered for the destruction of predatory species, or those considered harmful. These are given by states and provinces, arranged in alphabetic order."

The larger part of the bulletin is devoted, therefore, to a systematic treatment of the laws in each state, followed by a summary of fur protection, giving under the different species of fur-bearing mammals a table showing the length in days of open season for trapping various fur animals.

That California is lagging behind as regards protection for fur-bearers is evident by the following facts brought out in the bulletin: The mink has a closed season in Alaska, in twenty-four states and in nearly all of Canada; the skunk has a closed season in eighteen states; the raccoon in nineteen states; and the fox in eleven states. Not one of these fur-bearers is given protection in California.

The bear appears to be given poor protection everywhere. Only four states now have a closed season and a few of the states either forbid trapping or regulate it. In giving protection to bears California could be one of the leaders and it is hoped that this opportunity will not pass unheeded.

The bulletin above reviewed comes at an opportune time, for it will give much necessary data in connection with the attempt being made to give fur-bearers in this state the protection which they need during this session of the legislature.

DEATH CLAIMS TWO NOTED SCIENTISTS.

During the past year death has claimed two noted ornithologists. Professor Wells W. Cooke, in charge of the migration investigations of the United States Biological Survey, died at his home in Washington, D. C., March 30, 1916, from acute pneumonia. No man in the United States knew more about the migration of North American birds. The notes of hundreds of observers throughout the United States were annually compiled and the data thus obtained form a basis for many valuable publications dealing with bird migration. The distribution and migration of different groups of birds were treated in separate bulletins. Consequently we find such titles as "Distribution and migration of North American shore birds" (Biol. Surv. Bull. 35), "Distribution and migration of North American herons and allies" (Biol. Surv. Bull. 45), "Distribution and migration of North American rails and their allies" (Bull. U. S. Dept. Agric. 128). The most important general paper, one which sums up the present day knowledge of the migration of North American birds, treating of such subjects as causes of

migration, records of migration and speed of migration, is the one entitled "Bird migration" (U. S. Dept. Agric. Bull. 185). One of Professor Cooke's published articles entitled "Our greatest travelers" (Nat. Geog. Mag., 1911, 346–365), attracted wide attention and is one of his best known publications.

In the death of Professor Cooke those have lost the man foremost in research on migration. What younger worker will be able to continue the work so ably carried on by Professor Cooke still remains to interested in the birds of North America be seen.

Another ornithologist more closely related to work in California died at his home, Branchville, Maryland, October 1, 1916. This was Professor Foster E. L. Beal, assistant, United States Biological Survey, a man noted for his work in economic ornithology. Our first definite information on the foods of birds in California was the result of the work of Professor Beal, who for several years studied the relation of birds to fruit-growing in California.

The economic work of Mr. Beal came at a time when any esthetic or economic value that a bird might have was entirely overshadowed by depredations made more obvious by the conditions existing in a new country. The bringing under cultivation of large areas together with the consequent destruction of native food plants forces the birds to turn their attention to the substituted field crops and exotic trees and shrubs. The comparatively small amounts of this new food supply, which supplants the native one, results in more apparent destruction of cultivated crops. The dry summers form another factor in California conditions, for juicy fruits prove an acceptable substitute for water. With no regard for inherent values or protective measures, farmers formerly resorted to the gun and harmful and beneficial birds alike met the same fate. This was the situation when the bulletins on the food habits of California birds appeared.

The evidence brought forth in the bulletin "Birds of California in relation to the fruit industry," published in two parts (U. S. Dept. Agric. Bur. Biol. Surv. Bull. 30 and 34), so clearly showed the economic value of California birds that there was a noticeable change in the attitude of the ranchers of the state. Many other bulletins have shown the dollars and cents value of California birds and to Mr. Beal must be given credit for being the first one to show the economic relations of California birds and to develop interest in the protection of the insectivorous birds beneficial to agriculture. For twenty-five years economic ornithology has been enriched by the investigatious of this tireless worker who laid the foundations of economic ornithology in California.

HATCHERY NOTES.

W. H. Shebley, Editor.

MOUNT SHASTA HATCHERY.

After the completion of the distribution of trout fry from the different hatcheries of the state during the fall of 1916, the stations were put in shape for the coming season's operations.

This work was completed at Mount Shasta Hatchery during the month of December. During the month of November the first eggs of the eastern brook and Loch Leven trout were taken from the adult fish in the ponds. Operations were continued throughout the month of December and approximately 1,500,000 eggs of each variety of trout were secured. About 150,000 eastern brook eggs were also received at Mount Shasta Hatchery from the Marlette-Carson operations in the state of Nevada.

Six million quinnat salmon eggs were shipped to Mount Shasta Hatchery from the United States Bureau of Fisheries stations on Battle Creek and Klamath River. These eggs hatched out during the month of January and the fore part of February. They have been given careful attention and the oldest of the fry have now reached the swimming stage. When they have been reared to the proper age, a portion of the fry will be returned to the Klamath River, plants made in the upper reaches of the Sacramento River

tributary streams in the vicinity of Sisson, and the remainder will be transferred to the large rearing ponds and lakes of the Mount Shasta Hatchery. Those retained in the lakes and rearing ponds will be fed during the spring and summer months and liberated in the Sacramento and Klamath rivers after the first rains in the fall, when the condition of the streams is most favorable for their journey to the ocean.

Additional facilities for the rearing of quinnat salmon at Mount Shasta Hatchery are being provided. The Commission has leased from the Sisson Tavern Company the large artificial lake situated a short distance south of Mount Shasta Hatchery grounds, known as Sisson Lake. With the acquisition of this large body of water for a rearing pond for the quinnat salmon, this important branch of the Mount Shasta Hatchery operations will be greatly facilitated, as it doubles the capacity of the salmon rearing ponds.

FORT SEWARD HATCHERY.

A half million quinnat salmon eggs were hatched at Fort Seward Hatchery during the latter part of January. Previous to the receipt of this shipment of eggs, Fort Seward Hatchery had been fitted up for fishcultural operations for the season of 1917. The construction work commenced during September of last year, and the repairs to the hatching equipment were completed during the fore part of December. The salmon eggs are all hatched out and the fish are in excellent condition. As soon as the fish have reached the free swimming stage, they will be distributed in Mad and Eel rivers, Humboldt County.

As soon as steelhead trout eggs are ready for shipment from the eyeing stations, an ample supply will be shipped to Fort Seward Hatchery for stocking the streams of Humboldt and Mendocino counties.

MOUNT SHASTA AUXILIARY STATIONS.

Owing to the extreme drought throughout the state during December and January, the egg collecting operations were delayed until late in February. On February 1 a crew was sent to the stations at Bogus and Camp creeks, on the Klamath River. These two plants

Fig. 30. Hatchery A and breeding ponds at Mt. Shasta Hatchery. Photograph by G. H. Lambson.

were put in shape for the season's operations, but it was not until the latter part of the month that the large Klamath River rainbow trout commenced to run. The first spawning of the season was on February 17, when 120,000 eggs of this species of trout were taken. The storms throughout the northern part of the state increased the run of fish into the tributary streams of the Klamath River, where our egg-collecting stations are located, and the take of rainbow eggs now promises to be very good.

operations and very little work was necessary in the way of improvement. The hatching troughs were repainted, and a few minor repairs made to the building and hatching paraphernalia. The first steelhead trout eggs were received from the Scott Creek Station on February 20.

SCOTT CREEK STATION.

As in the streams of the northern part of the state, the run of fish in Scott Creek was delayed over a month, owing to the extreme drought. The steelhead trout

Fig. 31. Steelhead fishing on the Eel River.

ALMANOR HATCHERY.

On March 1 a crew of men will be sent to Lake Almanor, Plumas County, to open up the Almanor Hatchery, and Domingo Springs egg-collecting station. With the improvement in the Almanor Hatchery buildings, traps, etc., and the addition of the egg-collecting station at Domingo Springs, excellent results should be obtained from the fishcultural operations in Plumas County this season.

BROOKDALE HATCHERY.

Under the terms of the agreement entered into between the board of supervisors of Santa Cruz County and the California Fish and Game Commission, the Brookdale Hatchery was taken over by the commission on January 1. The hatchery was in excellent condition for

usually commence to run during the month of January, but this season it was not until February 20 that the first lot of eggs was taken. It was feared that our take of steelhead eggs this season would be very light; but with the heavy storms of the past ten days we are almost assured of at least an average take of eggs at Scott Creek Station.

SNOW MOUNTAIN STATION.

Whereas large numbers of steelhead trout are reported in the Eel River a short distance below the Snow Mountain dam, but very few fish have been taken in the traps at this station. It is probable, however, that with the recent storms the fish will soon commence to run, and our season's take will be satisfactory.

TAHOE HATCHERIES.

Preparations are now being made to open the Tahoe hatcheries at the usual time this season. Arrangements are under way to open the egg-collection station at Tallac on March 18.

MOUNT WHITNEY HATCHERY.

On January 21 the construction of Mount Whitney Hatchery was completed by the Department of Engineering and the plant was turned over to representatives of the Fish and Game Commission.

Fig. 32. Mt. Whitney Hatchery as it appears completed.

Previous to our taking over the hatchery, we had ordered all necessary supplies for the construction of all fishcultural equipment used in the operation of the hatchery, as well as paint for painting the hatching troughs. Therefore, we were prepared to go right ahead with this work. A portion of the hatching troughs have now been painted, and work is being rushed on the baskets, trough covers, etc. The hatchery will be ready for operations in ample time for the carrying out of our plans for the work this spring and summer.

With the Mount Whitney Hatchery and the auxiliary station at Rae Lakes in operation, the work of stocking the streams of southern California and the San Joaquin Valley as far north as the Yosemite Valley, will be greatly facilitated.

BEAR VALLEY HATCHERY.

During the month of November all necessary repair and improvement work preliminary to the operation of the Bear Valley Hatchery during the season of 1917, as far as could be undertaken during the winter months, was completed. All that remains to be done when the crew reaches the station is to set up the hatching troughs and install the racks in the streams tributary to the lake. The water in Big Bear Valley Lake is at a high level this season, and our operations should be very successful. It was expected that our crew could make the trip into the lake about March 1, but the recent storms and heavy fall of snow will probably prevent their making the trip before the 10th or 15th of the month. However, this slight delay should not interfere greatly with the prosecution of the work of egg collecting, as the fish do not start to run in great numbers before the middle or latter part of March.

UKIAH HATCHERY.

Ukiah Hatchery will be operated as usual this season. Steelhead trout eggs will be shipped to this hatchery from the Snow Mountain station, and the fry will be distributed in the streams of Lake, Mendocino and Sonoma counties. It is our intention to ship the first lot of eggs ready for shipment from Snow Mountain to Ukiah this season, in order that the distribution of the fish can be made as early in the summer as possible.

CONSERVATION IN OTHER STATES.

OREGON CONTEMPLATES INCREASE IN ANGLERS' LICENSE.

A number of the anglers of Oregon are advocating an increase in the price of angling licenses with the proviso that the additional fifty cents be set aside in a fund to be used exclusively in trout hatchery work. Whether the license will be raised from $1 to $1.50 will depend upon the extent to which anglers support the suggestion.

THIRTY FATAL HUNTING ACCIDENTS IN PENNSYLVANIA.

Thirty lives was the toll taken by the hunting season of 1916, although the total accidents were only 102, considerably less than the total accidents of 1915, of which twenty-nine resulted in fatalities. The decrease in the total number of accidents and the fact that no one was mistaken for game is accredited to widespread publicity against promiscuous shooting.—*Pennsylvania Sportsman January*, 1917, p. 15.

WANTED, BY NEW MEXICO SPORTSMEN.

1. An efficient nonpolitical *game warden.*

2. The passage of the Game Refuge Bill—with the *scalp of the Mondell Amendment* attached.

3. A law tacking the Federal Migratory Bird Law to the Canadian Treaty. Such a law will wipe out the last chance of the *spring-shooters.*

4. A *federal* fish hatchery for New Mexico.

5. Nationwide action to wipe out the last trace of *market hunting.*

6. Amendments to the state law simplifying the seasons, bringing it into conformity with the Migratory Bird Law, and authorizing the governor to proclaim temporary local closed seasons on any species on any area at any time.—*The Pine Cone*, January, 1917.

UTAH BIRD SANCTUARY.

In an effort to save the rapidly disappearing wild bird life of the state, arrangements have been completed for the establishment of Utah's first bird sanctuary, to cover an area of 700 acres. The use of the land is given free virtually to the state by property owners of the big cottonwood district, about four miles east of Murray.

State Fish and Game Commissioner Chambers will place quail and pheasants on the land, and his deputies will sprinkle feed there when the heavy snows of winter make it difficult for the birds to find anything to eat.—*Blue-Bird*, December, 1916.

GAME WARDENS TO BE UNIFORMED.

The wardens of the Conservation Commission of New York are to wear uniforms hereafter. The orders have been given because the commission believes that a uniform as a means of identification is appreciated by the public.

That a game warden be easily identified by people is important, but there is danger that the wearing of a uniform will afford a ready identification to the violator. Most states have thus far avoided the uniform and have believed more largely in the "plain clothes man" as an effective game warden.

SIXTH NATIONAL CONSERVATION CONGRESS.

Among the resolutions passed by the Sixth National Conservation Congress, held in Washington, D. C., on May 4, 1916, were those favoring the Chamberlain-Hayden bill and the Federal Migratory Bird Law. The following recommendations in the interest of aquatic life were also made:

a. That the states prohibit the unnecessary polluting of public waters;

b. That the fisheries in interstate waters be regulated by uniform laws, with the consent of Congress, not to be changed by one state without the concurrence of the other states affected.

c. That increased attention be given to the cultivation of fish in ponds on farms;

d. That the states take such action as will prevent the destruction of fish life in connection with irrigation.—*Recreation*, August, 1916, p. 78.

MINNESOTA ATTEMPTS TO REAR PHEASANTS.

The Minnesota Game and Fish Department reports that progress is being made in the propagation of pheasants at the Big Island Game Farm, recently established. About 1,200 eggs were secured from the thirty-six ring-necked pheasant hens, and eggs were also secured from prairie chickens and quail. As has been the rule elsewhere, a considerable toll was taken by crows and owls, and poachers and trespassers caused some injury to nesting birds. All of the young birds reared will be available for distribution in game refuges only.

LIFE HISTORY NOTES.

MORE BANDED DUCKS TAKEN IN CALIFORNIA.

During the 1916 open season, as in years past, several ducks originally banded in Utah have been taken in California. Mr. Chris Krempel killed a banded green-winged teal at the Greenwing Gun Club in Orange County during December, 1916. A report from the United States Biological Survey stated that the bird had been released at Bear River, Utah. On December 16, A. J. Buckley killed a green-winged teal at Los Banos, Merced County, bearing a tag numbered 3889. This bird was banded at Bear River, Utah, September 11, 1916. Another duck, banded at the same place on October 3, was killed by Henry Schubelhut at Brito, Merced County. S. G. Davis killed another teal bearing the number 4138 at the same place during January.—H. C. Bryant.

THE WOLF-EEL TAKEN IN SAN FRANCISCO BAY.

A fine example of the curious and interesting fish, the wolf-eel, was taken in San Francisco Bay, off Angel Island, February 13, by John Peetz and Bert Lake. The wolf-eel is a long, slender fish, bearing a superficial resemblance to an eel, but in reality not at all related to the eel. Its head is strong, its mouth filled with very strong conical canine teeth, the roof of the mouth being filled with rows of coarse molars. The head is only about one-eleventh of the total length of the fish. The dorsal and anal fins are very long, each of about 250 rays. The fish reaches a length of five to eight feet, and was one of the first, if not the first, species to be described from San Francisco Bay.

The first naturalist to study the fishes of this region was Dr. William O. Ayres, a charter member of the California Academy of Sciences. In 1855 Dr. Ayres obtained a specimen of this fish, which he described in the first volume of the Proceedings of the Academy. The fish was not only a new species, but it represented a new genus as well (*Anarrichthys ocellatus*).

The wolf-eel feeds chiefly on sea-urchins, sand dollars and the like. Although not often used as food, probably on account of its rarity, as well as its repulsive appearance, its flesh would no doubt prove nutritious and palatable if served in attractive form.—Barton W. Evermann.

SEA OTTERS SEEN NEAR MONTEREY.

Two sea otters were seen basking in the sun in the kelp beds off Del Monte between Seaside and Del Monte wharf on October 22, 1916. They were apparently an old and young one, and the theory is that the old one came back to look for one of her young which was caught in a sea bass net last year.—P. H. Oyer.

WILD SWANS ABUNDANT.

Apparently there was a great increase in the numbers of wild swans (*Olor columbianus*) visiting this state this past winter, 1916–17. All of the gun clubs in the Suisun district report the presence of swans on the duck ponds. One of the members of the Cygnus Club stated:

"Before daylight the air was very still and cold. The musical trumpeting of the swans could be plainly heard. As the members of the various clubs wended their way to the blinds for the morning shooting these great birds rose from the ponds where they had been resting and feeding, and circled the marsh, filling the air with their beautiful notes. The wild swan's note is one of the most plaintive and musical of all known birds."

I was on the marsh the same morning and should judge there were several hundred birds in small flocks circling in the air.—M. Hall McAllister.

WHITE MALLARDS.

A white mallard duck, the only albino mallard reported during the past open season, was killed in December, 1916, near Live Oak, California, by Sam Lamme, keeper of the West Butte Country Club. The bird, a male, has been mounted and is on exhibition at the clubhouse. Newspaper publicity has uncovered the fact that another mounted specimen of an albino mallard is in the possession of Colonel J. W. Dorsey of San Francisco. Still another specimen, a female, taken at Gridley, Butte County, several years ago, is in the collection of the California Museum of Vertebrate Zoology.—H. C. Bryant.

BIRDS LOSE THEIR WAY IN FOG.

During the early part of October several reports appeared in newspapers that numerous song birds alighted on ships far off the coast during heavy tule fogs. Most of the references to the kind of birds alighting on ships were couched in such generalities as: "hawks, blackbirds, sparrows and crows." Although we have attempted to secure more specific information the following facts only have been verified.

A large number of birds, of several different species, alighted on the Danish motor ship "Chile" when sixty miles off the Golden Gate, in October, 1916. One of the birds, obtained and held in captivity for a short time by Mrs. M. C. Terry, from a detailed description appears to have been a spurred towhee (*Pipilo maculatus*).

Dr. M. C. Terry, of the United States Public Health Service, saw a number of English sparrows and a warbler of some sort on the deck of the Norwegian steamship "San Joaquin," which docked on October 21, 1916. These birds were said to have come aboard the ship when it was off the lightship, about ten miles off "the heads." The pilot of the ship reported that blackbirds and a small owl also came on board.

On the same day the captain of the British steamer "Dunstan," sixteen days from Panama, reported that many different kinds of birds alighted on the ship from ten to twenty miles off shore. He estimated that as many as 200 birds were on the ship at one time. Some of them were quite tame and lit upon his arms and shoulders.

The above information, although lacking in scientific detail, still points to the fact that many land birds occur at some distance off shore, especially during heavy fogs. The taking of such a permanently resident species as the spurred towhee many miles off shore is of more than ordinary interest.—H. C. Bryant.

ANTELOPE APPEAR IN NEW LOCALITY.

On September 9, 1916, I saw one antelope (*Antilocapra americana*) at Coon Camp Flat, in the northern part of Lassen County. There were tracks of two more smaller ones that I did not see. Twenty years ago antelope were quite plentiful in this locality, but for a good many years none has been seen there. There are several bands in the eastern part of the county.—F. P. Cady.

Fig. 33. Boat load of sardines and unloading sardines at San Diego. The sardine run has been unusually large this past winter. Photographs by Webb Toms.

SEA OTTERS NEAR CATALINA ISLAND.

On March 18, 1916, 31 sea otters, two being young ones, were seen to the south of Catalina Island. Although one has occasionally been seen in this locality before, this was the largest number, to my knowledge, counted at one time.—Geo. Farnsworth.

THE LEOPARD FROG IN CALIFORNIA.

Mr. George Neale has recently called to our attention the fact that the leopard frog (*Rana pipiens*) is now to be found commonly at Lake Tahoe. The attempt of Mr. Neale to obtain exact information as to the introduction of this frog into the state has not been productive of detailed information, but evidence that it was introduced is at hand. Mr. George T. Mills of the Nevada Fish and Game Commission reports that the leopard frog is found commonly at Washoe Lake, a few miles south of Reno, Nevada, but that no one appears to know whether or not they were introduced here. A restaurant man is said to have introduced the leopard frog into the Carson Valley reservoir, near Reno, where it is now very common. According to Lawrence and Comstock of the New Brockway Hotel and Hot Springs, Brockway, California, this introduction took place about eight years ago. A short time after these frogs were planted the reservoir broke and Lawrence and Comstock secured one hundred dozen, which were planted at Tallac. Here they have increased rapidly in spite of the cold winter weather.

The regular occurrence of this frog in the markets of San Francisco and the constant attempts to introduce it into other suitable localities in this state make it important that all information as to introductions of this kind be recorded so that a history of attempts at introduction in this state will be available.—H. C. Bryant.

UNITED STATES FOREST SERVICE COOPERATION.

L. H. Whiteman, Editor.

GAME REFUGE PLAN SUCCESSFUL IN NEW MEXICO.

The proposed game refuge plan is approved in New Mexico. A report given out by the Forest Service there confirms the theory that deer will quickly recognize and take advantage of areas protected against hunters. According to the report made to the district forester at Albuquerque, M. L. Cadwallader, owner of a large pasture in one of the national forests, forbade it to hunters. The deer at once flocked to the pasture, and, it is said by the local forest ranger, now to contain more deer than all the rest of the district. In commenting upon this, the district forester said in part:

"The instance is said to be valuable in that it confirms the theory of the game refuge now before congress, which authorizes the establishment of a system of protected areas throughout the national forests of the entire West. The theory of the plan is that game will find refuge in the protected areas, where it will increase and overflow into the surrounding country, thereby improving the hunting outside. The refuges will also afford a means for preventing the extermination of rare species like mountain sheep and antelope, and it is claimed will relieve the present shortage of buck deer.

"The national game refuge bill, based on what is known as the Hornady plan, failed of passage at the last session of congress, in spite of widespread popular support. It is said that every game protective association and almost every chamber of commerce and stockmen's association in New Mexico heartily endorsed it. Sportsmen and forest officers are hoping that it will be enacted into law by the present congress so that the work of establishing a system of game refuges can go forward."

THE AUTOMOBILE A FACTOR IN GAME DECREASE IN EL DORADO NATIONAL FOREST.

The exceptionally fine recreational advantages to be had in the Sierra Nevada Mountains within the El Dorado National Forest draw many thousands of tourists, campers and sportsmen to the streams, lakes and favored hunting areas during the hunting and fishing season. The automobile has supplied a long felt want of rapid transportation for sportsmen and has resulted in an increased

amount of fishing and hunting. This in turn has to a considerable extent resulted in a decrease in the number of wild game, especially deer, quail and grouse. Except in the higher mountains, remote from roads and trails, there is annually a decided reduction in the number of grouse. Mountain quail are also decreasing slowly but surely. The number of bucks reported killed annually during the open season (not including the number of does and fawns that are killed, and bucks out of season, and all species killed by predatory animals) is, no doubt, exterminating the deer quite rapidly.

The proposed establishment of game refuges by the federal government in cooperation with state legislative enactment, will aid materially in the propagation of wild game. Three refuges are proposed for the El Dorado National Forest, located in the extreme northern, extreme southern and central portions, all bordering on or near the western boundary and extending far enough east to afford game protection during summer and winter.—E. J. Kotok.

SUGGESTED CHANGE OF PRESENT TROUT LAW.

As the number of fishermen increase along the north fork of Eel River it becomes more and more noticeable that the classing of the Eel River steelhead as a trout is working some hardship on the sportsmen. As the law is now, the limit is 50 fish, or 10 pounds and one fish, or one fish of 10 pounds or over. As very many of these fish weigh over 10 pounds, a sportsman catching one of, say, 11 pounds weight, would be obliged to stop for the day. This, it seems to me, is somewhat of an injustice, and I would suggest some plan whereby the limit would be three fish per day regardless of weight.—C. V. Brereton.

SQUIRREL POISON AND RATTLESNAKES.

The statement in the October number of California Fish and Game that the eating of poisoned squirrels will kill rattlesnakes appears to have been questioned. Here is an incident I give for what it is worth:

The members of Camp No. 1, of the Biological Survey, on the California Forest last year, found a rattlesnake writhing in a fit and half dead. Upon killing the snake they found it had swallowed a squirrel and they readily determined that the squirrel had been eating poisoned grain. It is probable that the squirrel was not dead when seized by the snake, but at any rate it seems positive that the strychnine will kill rattlesnakes. In connection with this, the records of the Covelo District for the past seven years show definitely that the snakes are decreasing in number.—C. V. Brereton.

TROUT PLANTING IN THE SANTA BARBARA NATIONAL FOREST.

Through the efforts of Forest Supervisor Hall a number of streams in the Santa Barbara National Forest were stocked last autumn with trout fry supplied by the Fish and Game Commission. In each case the fish were planted above impassable falls where no fish were to be found. Bouquet Canyon received 4,000 eastern brook; Lime Canyon, a branch of Cachuma Canyon, received 2,500 rainbow and 25,000 Loch Leven; Rincon Creek received 5,000 steelhead.

REPORTS.

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING DECEMBER 31, 1916.

Species of fish	Del Norte and Humboldt	Sonoma, Mendocino, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Totals
Albacore											4,568,088		37,444			4,605,532
Anchovy								1,500	191,170		2,900					195,570
Barracuda										2,590	185,470	1,168	2,130		338,218	520,486
Bonito										1,003	117,550	440	53,847		14,715	187,555
Bocaccio							2,390		51,305							53,659
Bluefish																
Chilipepper							8,799		42,758							51,557
Carp				4,849	9,367	18,348										32,564
Catfish		9,241		10,616	23,397	3,027										46,281
Coalfish						2,580		7,560	19,399							29,539
Cultus cod	18					121,719		49,931	51,881							223,549
Dogfish									165		1,200					1,365
Flounder	494		1,668			532	5,411				320		200			8,625
Halibut	5,709						540	1,800	1,347	41,012	33,201	8	34,045		915,344	1,033,006
Hake							30,390	12,650			7,042	201			6,847	57,130
Herring	716		84,970					100	51,930		1,295					139,011
Kingfish							330	5,650	9,123		139,440		1,820			156,363
Mackerel								15	501	30,126	279,119	605	55,706		50,154	416,226
Mullet														10,447		10,447
Pike				14	50	5,001										5,065
Pompano							28		11		1,957					1,996
Perch	19		10,683						260		66,667	10				77,642
Rock bass											74,515	1,949	43,203		18,362	138,029
Rockfish	523						223,302	237,373	357,462	20,016	521,631	467	82,304			1,443,078
Sole							1,078,428	457,992	11,911		75		330			1,548,736
Salmon	1,812,624	3,495		33,041	13,700	744,517		1,699	88,530							2,727,606
Smelt	25,183		2,083					12,843	40,571	10,930	114,562	72,125	45,183			323,480
Sea bass (white)			4,736					620	2,193	10,968	39,774		1,560		69,208	129,059
Sea bass (black)											7,645	160	60,034		23,161	91,000
Sand dab							322,580	162,580	1,844		3,594					490,598
Striped bass		207		16,530	37,834	162,322								207		217,100

Shad				5,771		207,426										213,197
Sturgeon						387										387
Sardine			2,370					16,715	6,301,050		2,374,855		2,318,698			11013,688
Skate							9,130	240				69				9,439
Sculpin											4,136					4,136
Sea trout												120				120
Tom cod							300									300
Trout (lake)														244		244
Trout (steelhead)	28,880															28,880
Turbot			20													20
Whitebait			8,946													8,946
Yellowtail											336,205	522	56,194		16,141	409,062
Miscellaneous			62		1,054	4,193	11,764	38	9,239	601	150,160	302	2,006	143	152	179,717
Total fish	1,904,166	12,943	115,541	70,821	85,402	1,270,055	1,693,392	969,306	7,232,650	117,156	9,031,401	78,146	2,794,704	11,041	1,452,302	26839,026
Crab (doz.)	1,170						15,187	1,208	926							18,491
Spiny lobster										12,270	65,500	10,064	53,023		36,226	177,083
Shrimp							106,013									106,013
Ecrevisse																
Squid								177	37,097		6,973	507	380			45,134
Cuttlefish							2,358	1,402	632							4,392
Clam (Pismo)								3,716		38,863						42,579
Clam (cockle)			2,517								6,177					8,694
Clam (softshell)		1,320	86,026			22,602	7,680									117,628
Clam (mixed)	10,938	240	3,080					1,585			160					16,003
Oyster (shell), No.							1,146,700									1,146,700
Abalones			2,685					270	117,040	1,675						121,670
Mussels										510	15,228					15,738
California oysters			845													845

VIOLATIONS OF THE FISH AND GAME LAWS.

December 1, 1916, to February 28, 1917.

Offense	Number of arrests	Fines imposed
Game.		
Hunting without licenses	30	$410 00
Deer, close season, killing or possession	23	560 00
Spiked bucks—illegal deer hides	5	175 00
Ducks, close season, killing or possession; excess bag limit	12	250 00
Shooting ducks from power boat in motion	8	55 00
Using a live or imitation blind	2	----------
Night shooting	2	50 00
Quail, close season, killing or possession	3	125 00
Shore birds—killing or possession	2	50 00
Nongame birds—killing or possession	14	144 00
Tree squirrels—killing or possession	1	25 00
Total game violations	101	$1,844 00
Fish.		
Angling without licenses	8	$150 00
Fishing for profit without licenses	9	50 00
Trout, close season; excess bag limit	9	370 00
Striped bass, underweight	1	----------
Black bass, possession, close season	2	30 00
Young of fish in possession	1	----------
Crabs, undersized	7	70 00
Clams—excess bag limit; undersized	10	43 50
Abalones—undersized	7	120 00
Lobsters—undersized and oversized	5	95 00
Seining within 750 feet of a wharf	6	25 00
Illegal fishing apparatus	24	510 00
Total fish violations	89	$1,463 50
Grand total fish and game violations	190	$3,307 50

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

December 1, 1916, to February 28, 1917.

Game.		
Ducks	2,418	
Geese	483	
Deer meat	652½	pounds
Cottontails	7	
Quail	2	
Nongame birds	15	
Squirrels	1	
Beaver pelts	6	
Deer hides	1	
Fish.		
Striped bass	498¾	pounds
Salmon	264	pounds
Trout	435	pounds
Black bass	18½	pounds
Crabs	332	
Clams	671	
Abalones	69	
Prepared abalone	353¾	pounds
Lobsters	52	
Miscellaneous fish	46	pounds
Nets	18	
Fish traps	12	
Set lines	1,500	feet
Chinese shrimp or bag nets	64	
Searches.		
Illegal fish and game	38	

STATEMENT OF EXPENDITURES FOR THE MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1916.

	October	November	December
General Administration.			
General administration	$1,562 68	$1,599 39	$2,199 92
Research, publicity and education	387 94	203 53	288 67
Printing	389 77	202 50	
Fish exhibits	351 85	83 50	
Game exhibits	28 39		
Game farm	313 70	202 21	322 06
Mountain lion bounties	160 00	220 00	200 00
Lithographing hunting licenses			
Lithographing anglers' licenses			738 50
Hunting license commissions and refunds	2,939 50	876 20	2,198 60
Anglers' license commissions and refunds	1,432 50	669 90	1,281 70
Market fishing license commissions and refunds	181 00	36 50	
Totals	$7,747 33	$4,093 73	$7,229 45
Patrol.			
San Francisco District	$5,485 78	$5,018 66	$4,989 63
Sacramento District	3,567 36	3,435 12	3,336 10
Los Angeles District	2,015 68	1,996 05	1,767 41
Launch patrol	828 61	710 13	956 30
Prosecutions—fish and game	245 68	384 10	31 40
Crawfish inspection	100 00	100 00	100 00
Winter game feeding			
Accident and death claims	12 00		
Totals	$12,285 11	$11,644 06	$11,180 84
Department of Fish Culture.			
Hatchery administration	$868 90	$776 10	$816 42
Mount Shasta Hatchery	1,262 23	1,825 46	1,618 65
Mount Shasta Auxiliary Stations			25 00
Mount Whitney Hatchery	680 78	614 77	742 41
Mount Whitney Auxiliary Stations	336 91		
Tahoe Hatcheries	64 37	10 50	10 00
Tahoe Hatcheries Auxiliary Stations			
Marlett-Carson Hatchery	185 45	181 95	237 35
Fort Seward Hatchery	743 21	328 14	437 57
Ukiah Hatchery			
Snow Mountain Station	3 05	7 00	
Brookdale Hatchery			16 00
Scotts Creek Station	576 38	75 00	31 00
Almanor Station	1,072 48	239 26	6 00
Bear Valley Hatchery	32 87	155 67	8 75
Yuba City Shad Station	1 05		
Fish distribution	1,471 78	488 24	262 58
Fish transplanting	134 30		15 00
Screen, fishway, water pollution	539 51	535 15	505 70
Totals	$7,973 27	$5,237 24	$4,732 43
Commercial Fisheries Research and Patrol.			
Fishery research and patrol	$490 26	$513 85	$344 72
Grand totals	$28,495 97	$21,488 88	$23,487 44

From drawing by Charles Bradford Hudson

QUINNAT SALMON *(Onchorhynchus tschawytscha)*

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 3 SACRAMENTO, JULY, 1917 Number 3

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A SYMPOSIUM ON NEW FISH AND GAME LEGISLATION.

NEW FISH LEGISLATION.

By W. H. Shebley.

Of all the new legislation that of most general interest to fishermen is the act providing for the earlier opening of the trout season. Because of general demand by fishermen of the coast section, the trout season will hereafter open on April 1, instead of May 1. Although reasonable regarding the coast streams, this new law will allow the taking of fish during the spawning season throughout the mountain districts, with the exception of the new fish districts 24 and 25, where the season opens June 1, after spawning is practically over.

By another act the season on golden trout will henceforth open on July 1, instead of July 31.

Agitation regarding the prohibition of the use of salmon eggs in angling, which was noticeable during the early part of the legislative session, stirred up so much adverse sentiment that the matter was dropped even before a bill had been framed.

An act prohibiting the sale of trout met with considerable opposition by the fishermen of Lake Tahoe. Every argument advanced in favor of the nonsale of game can be used in defense of the nonsale of trout. The act was finally passed and it is hoped that fishing conditions about the mountain lakes will steadily improve. Stopping the sale of trout means that the angling of Lake Tahoe, and other mountain lakes, will be open to all those who will take the trouble to enjoy it. The new law will take effect November 1, 1917.

Needed protection for salmon, shad, and striped bass, during the spawning season, is provided by an act which closes the season for these fish from June 6 to July 31.

Henceforth the black bass season in the entire state will open on May 1. A closed season for black bass in Clear Lake, Lake County, is provided for in the same bill.

The act relating to the domestication of fish has been amended and greatly improved.

The act relating to the construction of fishways was amended, making it possible for a company to provide a hatchery in lieu of a fishway. In some cases it has been found well nigh impossible to construct a fishway over some of the large dams recently constructed in the state. The new law makes it possible to restock the waters above such dam by means of a hatchery paid for by the company building the dam, but constructed under the supervision of the Fish and Game Commission.

LEGISLATION AFFECTING THE COMMERCIAL FISHERIES.

By N. B. Scofield.

The legislature which adjourned at noon on April 27, 1917, enacted several laws of importance to the commercial fisheries of the state. Three of these laws stand out from the rest, not only in importance but in being radically different from the ordinary line of legislation. These three are what were known as Senate Bill No. 767, by Senator Thompson; Senate Bill No. 87, by Senator Luce, and Assembly Bill No. 73, by Assemblyman Mouser.

Senate Bill No. 767, also known as the Fisheries Tax Bill, provides that all packers, canners and curers of fish, and all wholesale dealers in crustaceans or mollusks shall pay to the state a tax of 2½ cents for each 100 pounds of fish received for use in other than its fresh condition, or of crustaceans and mollusks received irrespective of the form in which they are to be used. The money thus collected is to go into the fish and game preservation fund to be used for fisheries patrol and investigation work in the districts from which the revenue is derived. Although this tax is new in this state, such a tax has existed for years in nearly every other seacoast state. The recent remarkable growth of our commercial fisheries makes it necessary to maintain a more adequate patrol so that the present conservation measures may be enforced. It also makes it

more necessary to conduct investigations of our food fishes, so that we will be able to conserve the supply with intelligence. The revenue derived from this tax, while it is much smaller than in other states, will enable the fish and game commission to do much more than it has in the past. It will be able at once to provide a seagoing patrol boat for southern waters, and already the services of a fisheries investigator have been secured.

Senate Bill No. 87, known as the Fish Exchange Bill, gives the State Market Director the power to control the fresh fish markets of the state. By this bill the market director can fix the maximum price to be charged by the retailer, the wholesaler and the fisherman for all kinds of fish used in the fresh state. Wholesale and retail fish dealers will pay a license in proportion to the amount of fresh fish handled, which revenue will be mainly used in popularizing the use of the less well-known but good species of fish by advertising. Past investigations of the Market Director have convinced him that, contrary to the prevalent belief, the fish dealers are none of them making great profits; that the comparative high cost of fish is due to marketing conditions and to the fact that the public has never acquired the habit of eating fish. It is his plan to reduce the cost of fish by increasing the consumption and by inducing the people to eat fish more than once a week and on other days than Friday. If dealers can sell more fish and on more than one day a week they will be able to sell cheaper. It has been demonstrated that reducing the price of fish will not materially increase the consumption unless accompanied by advertising. The Market Director will advertise the fish and as the consumption increases the cost will be correspondingly reduced. Fish constitute one of the natural resources that still belong to the people of the state, and just as it is right and proper for the state to control the catching of fish, so is it proper for the state to control the marketing of its fish.

Assembly Bill No. 73 entrusts the regulation of kelp harvesting to the Fish and Game Commission. Under the provisions of the bill a tax of $1\frac{1}{2}$ cents per ton of wet kelp harvested will be paid to the state. Two-thirds of this revenue will go to the Fish and Game Commission for patrol work and one-third to the Scripps Institution for scientific investigation work on the kelp. Since the supply of potash from Germany has been cut off this country has had to look elsewhere for its potash. Our source of potash that this necessity has developed is the giant kelps or seaweeds growing along our Pacific Coast. At least $3,000,000 has been invested in the industry in southern California. The United States government is investing $175,000 in an experimental plant at Summerland, Santa Barbara County, for the purpose of working out economical methods of extracting the potash and of utilizing the by-products, so that the industries may be able to continue at the reduced price of potash that is sure to come after the war. The government and the companies engaged in kelp harvesting realized that supervision of some sort was needed for the conservation of the kelp beds. The matter of jurisdiction was taken up with the Solicitor General and he rendered the opinion that the kelp beds are under the jurisdiction of the state.

The government representative and those engaged in the industry then took the matter up with the Fish and Game Commission and the Scripps Institution with the result that Assembly Bill No. 73 was drawn up according to the ideas of all concerned.

There was no opposition to the main features of the bill, but the amount of the tax created considerable discussion. The idea had gone forth that the kelp companies were making immense profits and several of the legislators thought that the tax of 1½ cents per wet ton that was proposed in the bill was entirely too low. An expert accountant was sent to southern California by the Board of Control to investigate the claims of the larger companies that they are operating at a money loss. The report of this accountant satisfied the Committee on Revenue and Taxation that their statements were correct and the bill was passed out with favorable recommendation. It is hoped that the work of the government's experimental plant, together with the work carried on in the chemical laboratories of the larger companies, will be so successful that the manufacture of potash and other products from kelp will remain as a permanent industry after the war.

Other acts of interest are those providing for: The nonexport of abalones; an increase in the minimum size of spiny lobsters from 9 to 10½ inches and the maximum size from 13 to 16 inches; and prohibition of the taking of oysters from beds quarantined by the State Board of Health.

NEW GAME LEGISLATION.

By J. S. Hunter.

Probably no measure ever passed by a California legislature will have so far-reaching an effect on the supply of game as Assembly Bill No. 759, introduced by Mr. Lyon. This bill, which was an amendment of the former districting act, creates sixteen new game refuges. These refuges are scattered throughout the Sierras and the Coast Range, and in connection with those already established, together with national parks, will form a chain of refuges reaching from the Oregon line to the Mexican border. The smallest one of these new refuges, situated on the north side of the Klamath River, comprises 8,960 acres; the largest, near the headwaters of the Sespe River, in Ventura County, includes 125,440 acres. The new refuges add 811,180 acres to the areas already set aside, making a total of over 1,500,000 acres set aside as game refuges in California. In the refuges all hunting, except for predatory animals under permit from the Fish and Game Commission, is prohibited. There will be no special restrictions on fishing. So long as these refuges endure the state will have a permanent supply of game. Another bill provides for a game refuge in the vicinity of Mount Tamalpais. The possession of guns in this sanctuary is made unlawful.

Radical changes were made in the so-called "Bowman Act" of 1913, providing for the breeding of game in captivity. The most important change is that in the cost of a breeder's license. Under the old law the license of $25 deterred many people from going into the business of

raising and selling domesticated game. The license fee is now $2.50. More reasonable provisions as to the marketing of game reared in captivity are also provided.

Needed legislation protecting fur-bearing animals during the summer season when their fur is of no value is to be found in the trapper's license law. Fur-bearing mammals are defined, and a license costing $1 is required of all who trap for profit. Protection for the black bear and fisher are included. Fundamental information looking toward more protective legislation for fur-bearers will be derived from the reports required of each trapper.

Fig. 34. Black bear in Yosemite Valley near Camp Ahwahnee. Photograph by Miriam Gibbons. The black bear is now given protection during the summer season when its fur is of no value.

Needed protection for sage hen and grouse is to be found in two bills, one which provides for the total protection of the sage hen in Mono and Inyo counties, the other for a reduction of the season on grouse to one month, September 15 to October 14, inclusive. The season on valley and desert quail will henceforth open one month later (Nov. 15), but will not close until the first of February.

In order that there might be no confusion between state laws and the Federal Migratory Bird Law, the season on waterfowl was made to conform with the federal law. The season now opens on the sixteenth of October, and all shore birds, with the exception of the jack snipe, are protected.

Of great interest to deer hunters is the new act providing that a deer lawfully killed in an open district may be taken into a closed district after proper affidavit has been made. The man who could not take

his vacation until after the season closed in his own district has heretofore been unable to bring back with him venison which he secured in another district. The former law not only made it inconvenient, but oftentimes forced a waste of a valuable food supply. The law protecting elk was strengthened by making it a felony to have elk meat in possession. The act providing for the forfeiture of the license upon a third conviction for a violation of any of the fish and game laws should be instrumental in creating greater respect for all of the fish and game laws.

A change in the season on doves, making the season open in District 1 on August 1 instead of September 1, is a step backward. Many doves are still nesting in August.

The periodical attempt to remove certain nongame birds from the protected list this year resulted in the placing of the blackbird among the unprotected birds in Districts 1, 2, and 3, because of their damage to rice and other growing crops. So little damage is done by blackbirds in southern California that the birds are still protected in District 4. After the first day of November, 1917, a state law will prevent the sale of aigrettes, plumes of the osprey and bird of paradise, or other plumes or feathers.

A bill placing the black-tailed jackrabbit among the predatory animals gives needed relief to the man who has had to withstand the attack of this animal, because it was classified by law among the game mammals. Other items were passed which amended slightly the existing laws. These changes will be noted upon the abstracts, soon to be issued by the Fish and Game Commission.

There were many attempts to introduce bills to tear down the protective laws already passed. Several attempts to take protection from valuable nongame birds failed, as did also attempts to place bounties on predatory species. Alleged destruction of crops by ducks and geese led to an attempt being made to allow the killing of these birds where they were doing damage, but this dangerous bill did not pass out of the hands of the committee. Two dangerous bills, one providing for the appointment, by the Governor, of one fish and game commissioner, with a salary of $5,000 a year, and with $20,000 worth of patronage at appointee's disposal, and another one providing for the transference of all fish and game license funds to the state treasury with a small appropriation therefrom for the work of the Fish and Game Commission, fortunately were killed in committee.

DEVILFISH AND SQUID.

By Harold Heath, Department of Zoology, Stanford University.

From time immemorial it has been customary for illiterate, untrained and superstitious races of men to apply the adjective "devil," or its equivalent in other languages, to animals having a horrible, terrifying appearance or some fancied, mysterious power of creating evil and bad luck generally. In the English language we have the name devilbirds or owls, devil's coach and riding horses and devil's darning needle among insects, a skeleton-like shrimp is known as the devil shrimp, and finally there are the devilfishes, animals related to the squid, cuttlefish, nautilus and scores of less familiar relatives.

That the epithet "devilfish" should have been applied to these last named creatures is not surprising, for some of them at least have not

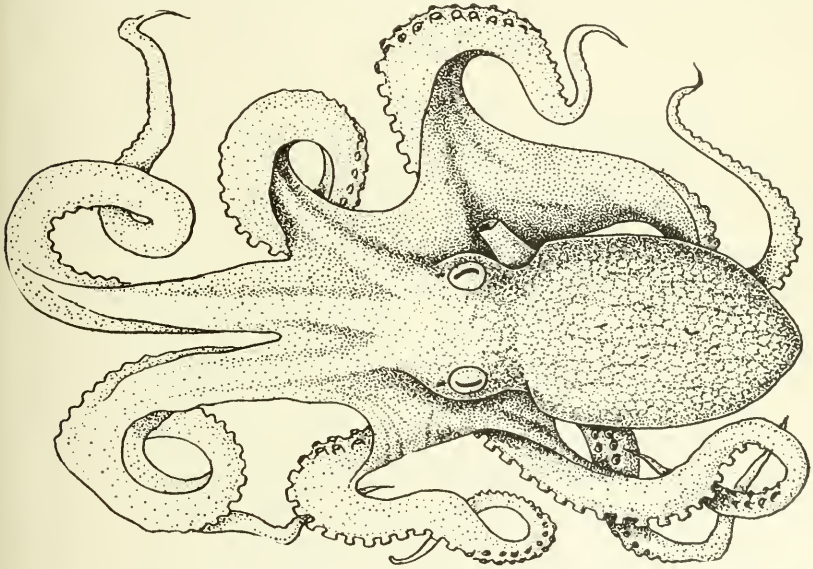

Fig. 35. The common devilfish (*Polypus* [*Octopus*] *hongkongensis*) of California.

been endowed by nature with a prepossessing appearance. Long, snaky arms bearing hundreds of suckers, sinister looking eyes, a lumpy, ungraceful form of body, and the creepy sensation produced by the cold, clammy suckers when they fasten to naked flesh is enough to relegate the whole tribe to the abode of evil spirits. Furthermore, the dislike we instinctively feel for these animals has been unduly heightened by a line of story-tellers headed by Victor Hugo and ending with the fisherman on the dock. All have let their fancy have free rein and fact is often as difficult to find as snakes in Ireland.

Before we attempt to separate fact from fiction certain matters call for consideration. In the first place, it might be inferred from the names devilfish, cuttlefish, ink fish and so on that these animals are closely related to the true fishes. Correct it is that certain species are active swimmers endowed with keen senses and are able to stalk their

prey as successfully as the herring, sardine, or any other fish. Nevertheless, all devilfishes, squids, the nautilus—a thousand or so species in all—are in reality mollusks or shellfish related to the abalone, mussel, oyster and kindred types. At first sight there is indeed very little to suggest that the abalone and the squid for example, are blood relations; in fact, it is only with the greatest patience that students of zoology have discovered the true state of affairs. We now know that the arms of a squid or devilfish (fig 35), borne on the head, form collectively a modified foot corresponding to the flat creeping sole that anchors the abalone to the rocks, and to the hatchet-shaped lobe that drives the Pismo clam through the sand. For this reason, the class comprising the devilfish, squid, cuttle, nautilus and their relatives are known as cephalo-pods, meaning head-footed animals. It may be added that the devilfish alliance possesses eight arms while the squids have ten, two of which are two or three times as long as the others (fig. 37). Furthermore, the members of the squid group can be distinguished from the devilfishes by the presence of two leathery flaps or fins at the hinder end of the body.

In addition to these features, the portion of the body lying next to the shell in the abalone—the so-called visceral hump—has been drawn out into a cigar-shaped body in the squid, and the "backbone" or pen it conceals beneath the skin, is a rudimentary shell. In the devilfishes the body is more rounded and the shell disappears completely in early life. In the squid-like sepia or cuttlefish the shell or cuttle bone is relatively large and like a porous stony plate is a familiar object in canary bird cages. In this connection it may be added that in olden days, and even yet in certain districts, powdered cuttle bone was reputed to have a mysterious power of curing colds, a teaspoonful in a cup of water being deemed sufficient to produce a health-giving sweat.

In similar fashion it is possible to trace a resemblance between the various internal systems of organs in the abalone, for example, and the head-footed group, finding in all a well-developed heart and connecting blood vessels, a clearly defined nervous system with "brain" and nerves extending to all parts of the body, and finally there is a complicated kidney and reproductive apparatus. It is popularly believed that the abalone and oyster are among the humble beings of earth, but humility is certainly not synonymous with simplicity of organization; for all of these animals, the squids and devilfishes included, are not far behind the lowest backboned animals when the architecture of their bodies is considered.

It should be noted, however, that although the devilfish-squid alliance is constructed upon the same fundamental plan as the abalone-clam aggregation, the first-named group is provided with several features fitting them for an active aggressive type of existence. The eyes on the head are as highly developed as those of a fish, the senses of smell and touch are keen, and there is reason to believe that the sense of taste is acute. Thus provided, they are enabled to steal upon their prey and to avoid enemies to a highly successful degree. To agility and naturally acute senses should be added their surprising ability to change their color to harmonize with that of their surroundings, so that prey and enemies alike are usually unaware of their proximity. This color change

is based upon minute elastic sacs (fig. 36) filled with pigment and supplied with muscles for causing their expansion. As a devilfish crawls about on the sea bottom its color can be seen to change in a twinkling from deep chocolate through dull red and brown to gray. If sand or rock is encountered on the journey the skin is usually thrown into lumps and ridges, so that under all conditions the body is practically invisible. The squids have an even greater range of color change, some species being capable of assuming almost every tint of the rainbow. If it should happen that some keen-sighted enemy, such as a wolf fish or eel, should spy out any of these chameleon-hued animals a further means of escape is provided by the so-called ink bag. In every case this is a bag concealed within the body and filled with a brownish or black fluid having the same appearance as india ink. This is squirted into the face of any formidable intruder and in the gloom thus produced the attacked is enabled to steal away to a place of safety.

As a concluding remark to this section of the paper, attention will now be directed to the method of cephalopod locomotion, which is without a counterpart among the remaining members of the animal kingdom. If a devilfish at rest upon the sea bottom or in an aquarium be watched for a time its body will be seen to contract and expand every few seconds. With each expansion a slit in the neck region, and leading into a spacious cavity within the body, opens to permit the entrance of a stream of water supplying oxygen to the two feathery gills concealed within. At the outset of the contracting movement a valve prevents the outgoing stream of water from escaping as it came, and directs it through a tube or funnel, also known as a siphon, which can be seen on the right side of the neck in figure 35. These gentle periodic movements are associated with breathing. If the animal is disturbed the movements become more active and if sufficiently violent the water stream escaping by the funnel drives the animal backward as escaping gases drive a sky rocket. In this way all cephalopods can move, often with the rapidity of a fish of the same size, but the movement is invariably backward. When a devilfish moves forward it creeps along by means of its flexible snaky arms and suckers. The members of the squid group, on the other hand, move with equal facility backward or forward, the forward movement being brought about by the fins.

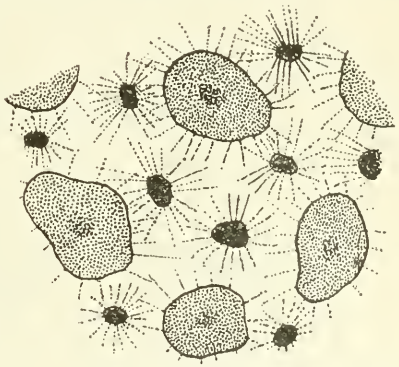

Fig. 36. Color sacs in the skin of any cephalopod. In this case the body is red owing to the expansion of the red sacs, while those containing brown, blue and yellow pigment are contracted.

Coming now to the subject of California cephalopods we learn from a recent report, "A Review of the Cephalopods of Western North America by S. S. Berry—Bulletin of the Bureau of Fisheries, Vol. 30, 1910," that fifteen species have been recorded from the waters adjacent to the coast. Four of these are true devilfishes, an equal number are close relatives, while the others are squids or allied species. Of the two devilfishes

occurring in shallow water along shore, one (*Polypus* [*Octopus*] *bimaculatus*) is rather rare and ranges from the southern part of the state to Panama. The second species (*Polypus hongkongensis*), a familiar object in the city markets, has a remarkably wide distribution, being found along the western coast of North America and eastern Asia from Panama to Hongkong, China. This species is usually not over three or four feet in length, though occasionally specimens have been reported of enormous size, having arms ten feet or more in length. With one exception (the paper sailor), the other eight-armed species are very rare indeed, since they live on the ocean floor at depths ranging from six hundred feet to two and one-half miles.

The paper sailor, paper nautilus or argonaut (*Argonauta pacifica*) is an inhabitant of warmer waters, ranging as far north as the bay of

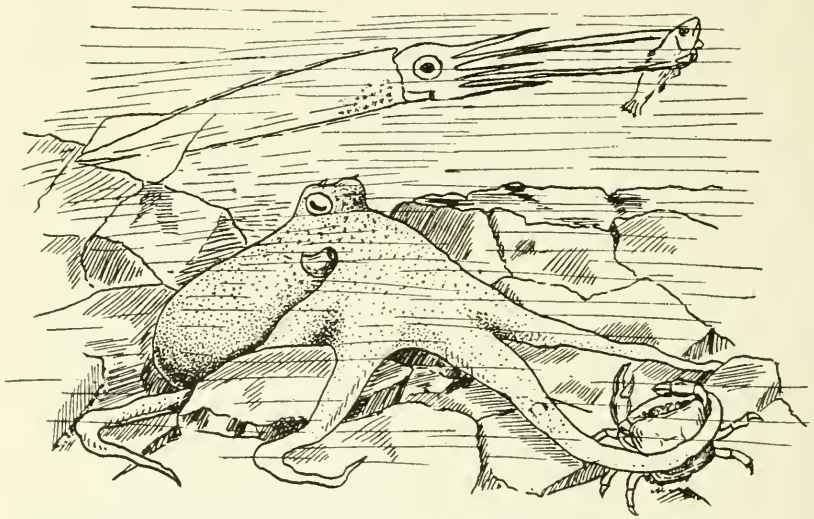

Fig. 37. Methods the squid and devilfish employ to capture prey.

Monterey, and during storms is ocasionally cast ashore. Unlike the other California devilfishes, these animals swim at the surface of the sea, and, unlike any other cephalopod, the female, by means of her arms, secretes and moulds a beautifully sculptured shell that serves to protect her and the young. The argonauts are all of small size, of no commercial value, though their shells bring fancy prices.

Among the squids of the coast only one species (*Loligo opalescens*) is sufficiently abundant to be familiar. The so-called giant squid (*Dosidicus gigas*) occasionally migrates from the southern hemisphere, and has been captured as far north as Monterey. Full grown individuals attain a total length of four feet, but although the Golden West is the home of many natural products of record breaking size, this one, when compared with a species from Newfoundland, is a pygmy. The eastern representative has a total length of fifty feet, a body seven feet long, and its eyes have the area of Thanksgiving dinner plates. The other squids of California are relatively small, and are largely confined to deep water.

One of these last-named species has no common name but its scientific cognomen is a mouthful—*Melcagrotcuthis hoylei.* It is mentioned here owing to the fact that, living at depths ranging from 3,000 to 6,000 feet, where sunlight never penetrates, it is bounteously provided with metallic-looking phosphorescent spots, which in life must light it up like a man-of-war and serve either to attract prey or its mate as the glow-worm and firefly are wont to do.

Coming back to the subject of the common squid (*Loligo opalescens*), we find its range extends from Puget Sound to San Diego. At certain seasons of the year immense schools are encountered off our coast, invariably followed by seals, sea-lions, salmon and various other fishes. As the food of the squid consists of small fishes, shrimps and other small animals, and since these come to the surface mainly at night, squid fishing is usually done after the sun goes down. Several years ago when squid fishing was an important industry in Monterey Bay, the Chinese provided their sampans with metal baskets in which a fire was built and rowing about netted their unwary prey attracted by the light. Five thousand odd tons were taken in a single season and were dried on the ground, or in the case of higher grades, were cleaned and dried on racks. It is reported that the low grades were sacked together with large quantities of salt, on which the duty was high in China, and were shipped to that country as fertilizer on which the duty was low. Subsequently, the squid were used as fertilizer, but the salt was refined and sold. The choicer brands were used for soups and other dishes celestial only in name. Nevertheless, it is possible to place before the American epicurean a dish of tender squid, lightly boiled in oil, that not only is most nutritious but of most delicate flavor. The dishes of the California devilfish tested by the writer can not be described with such gusto. On the shores of the Mediterranean this article is tender and of excellent flavor, but the California product needs some softening influence to destroy its rubber-like consistency.

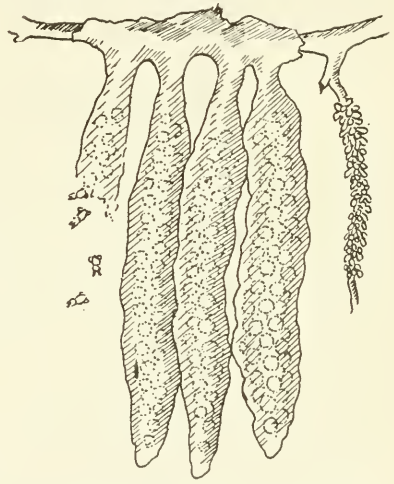

Fig. 38. Egg masses of the devilfish (on left) and squid attached to a twig. Young are escaping on the right.

The common California squid measures about ten inches in length, and there is reason to believe that it attains its full size in one year. The eggs are laid from early spring until midsummer, and looking like small shot, though whitish in color, are imbedded in translucent, milk-colored, jelly-like masses three or four inches in length and anchored to rocks, sticks and other solid objects (fig. 38). After a few weeks the young, a quarter of an inch in length, make their escape, become an inch long by the last of August, twice this length by the middle of October, and are nearly grown by May.

In conclusion, let us return to the subject matter of the opening paragraphs. Do devilfishes and their relatives ever attack man, and is there any basis in fact for the pictures we used to gloat over in our

schoolboy days where gigantic cephalopods draped their arms about the hulls of ships with enough left over to reach half way up the main mast? Doubtless men can be found in this state who have at least one acquaintance who has heard of a man that has lost his life in an encounter with a devilfish, and curiously enough the longer the line of informants the more lurid the tale. As a matter of fact, a strong man has difficulty in dislodging a freshly caught four-foot devilfish, and when it is remembered that some of these creatures attain a length of from ten to twelve feet it is altogether possible that they could overturn a rowboat and drag the occupants down. There are several authentic accounts of battles between giant cephalopods and fishermen, but in all the literature at hand the fishermen came off victors. Generally speaking, all of these animals along our coast are of a shy, retiring disposition and are of relatively small size, so that so far as they are concerned we can continue to enjoy the climate and live our allotted three score years and ten.

NEGLECTED PACIFIC FISHERY RESOURCES.*

By John N. Cobb.

The Pacific coast has been so bountifully gifted with salmon that it has from the very beginning been difficult to develop a market for other varieties of sea food, but as the consumption of fishery products throughout the country at large increases, and methods of distribution improve, the people are indicating a desire for a greater variety from which to choose, and this will ultimately furnish an outlet for the many species which are now either neglected entirely or but sparingly used. As it has been impossible to treat of all in the compass of a paper of this class I have selected the most prominent.

The black cod (*Anoplopoma fimbria*) is very abundant in our northern waters, and large quantities are taken on halibut trawls when set in deep water. The black cod is a most delicious food fish, of firm and flaky texture; it is white in color and rich in flavor. While the market for this species is steadily widening, the supply which could be brought in far exceeds the demand.

Owing to its oiliness it is not easy to pickle-cure this fish. The best method has been found to be that of double pickling. After being in pickle once the fish are taken out and put in fresh pickle a second time from two to five days. The second pickle is then boiled and the fish are replaced in that fluid after it has cooled and are then shipped to market.

The eulachon, or candlefish, run in enormous schools in some of our Alaska streams from late in March till in May, but, although a most digestible and nutritious species, very few are eaten by the whites. They are almost invariably pickled. It is not good for canning, as the flesh drops from the bones after cooking, and when the can is opened the contents present a much jumbled and uninviting appearance. The flesh of the eulachon is said to be as restorative to the wasted human system as cod-liver oil.

*Paper read before the annual meeting of the Pacific Fisheries Society held in Seattle, Wash., on June 10–12, 1914.

The oil, which is abundant in the tissues of the fish, has very superior qualities and might be made commercially important if the proper methods were followed in its extraction and refining.

Of the large schools of herring which frequent our coast, relatively but very few are prepared for market, and these usually in a slipshod manner. Were the fresh fish selected with care and an eye to having all the fish in a barrel of about the same size, the fish gibbed and then salted carefully, and after the fish have been cured sufficiently repacked in barrels which are filled so full that the fish can not be jumbled up, the finished product would fetch prices more nearly consonant with the best foreign herring. I put up some on the Shumagin Islands in 1912 and 1913 which averaged almost one pound each in the round and ran about 225 to the cured barrel, and these brought almost the same price as the best Norwegian herring in the California markets.

Several attempts have been made on Puget Sound to build up an industry in the canning as sardines of the young herring and pilchard which frequent these waters, but all have failed through inability to compete with the cheap and abundant labor available for the Maine canneries.

In Alaska are to be found enormous numbers of Dolly Varden trout, and lesser numbers of rainbow, cutthroat and Great Lakes trout. The Dolly Varden trout are the deadliest enemies the salmon have in Alaskan waters, as they devour both the eggs and the young. Owing to their being classed in the states as game fish, it is almost impossible to find a market for them in a fresh or frozen condition. At present, the state of Washington, thanks to the broadmindedness of Commissioner Darwin, permits of their sale in the local markets. A few hundred cases are canned annually in Alaska, and these are prepared in the same manner as salmon. If medium-sized fish were selected and packed whole in one- and two-pound oval cans, they would present a more inviting appearance, and I believe a big trade in them could be built up throughout the country, as a trout label would be a novelty in the East and also one to conjure with, as the name stands for a choice article in the minds of the people.

It is a question of only a few years when the shad fishery of the Pacific coast will be of first-rate importance. At the present time it is so overshadowed by its giant brother, the salmon fishery, that it is almost lost sight of. The fish are taken mainly on the Columbia and Sacramento rivers. Most of them are marketed in a fresh or frozen condition, but some thousands of cases of both fish and roe are canned each season. The demand for shad is slowly but steadily increasing.

Whitefish (*Coregonus*) are found in many of the inland lakes and streams of the Northwest and in Alaska. Some commercial use is being made of them in Washington, where they are seined in the lakes and shipped to Chicago and to near-by western states. In Alaska the whitefish has no commercial importance and is not utilized except as food for the natives who eateh them. They are a delicious fish and will compare very favorably in edible qualities with the Great Lakes whitefish.

Atka mackerel (*Pleurogrammus monopterygius*) is found in large schools mainly along the Aleutian chain. Codfishermen frequently find schools when fishing around the Shumagin Islands. The fish are rather

hard to cure properly, but when the work has been well done they are delicious in flavor. In the early days of the Nome rush when the steamers made regular stops at Dutch Harbor for coal, a small business was maintained by the natives of Unalaska in selling pickled Atka mackerel, but when the vessels ceased making it a port of call, the business died out. If the name were changed and a strong effort made to exploit this species, I believe a good business could be built up. It would be necessary to change the common name because the fish is not a mackerel at all and bears no resemblance to one, it having acquired the name because of a fancied resemblance in flavor to the other species. Either of its other common names—"striped fish" or "yellow fish"—would be appropriate.

Fig. 39. Chinook salmon on floor of Monterey Packing Company's plant at Monterey. Little attempt has been made to save the by-products of the tons of salmon canned and cured along the Pacific coast.

The cultus cod (*Ophidion elongatus*), several species of the sea bass, known locally as red rock cod (*Sebastodes ruberrimus*), Sitka black bass (*Sebastodes melanops*), etc., various species of flounders, including the deep-sea sole, are excellent food fishes and are to be found in abundance along our northern coast and in Alaska. Most of them now find a limited market in the coast towns, but eventually they will be shipped to all sections of the West as their food qualities become better known.

The most remarkable instance of wholesale waste of fishery products is to be seen in connection with the great salmon industry of this coast. In 1913 some 140,000,000 salmon were used in a fresh condition, and in canning, pickling, mild-curing, freezing, smoking, etc. Estimating the loss in dressing these salmon at 25 per cent, a most conservative estimate, gives us the enormous total of 101,186 tons of offal. With the exception of about 7,000 tons which were used at a few small plants, all of this enormous total was thrown back into the water, thus, not

only wasting valuable material, but polluting the water from which the fish originally came. For various reasons not all of this material could be saved, but the amount that could be worked up into merchantable products is surprising.

Included in this enormous amount of offal are millions of pounds of salmon eggs. Although Siberia prepared 250 tons of salmon eggs as caviar in 1913, only about 24,000 pounds were prepared upon the Pacific coast of America during the same period. It is a comparatively easy matter to prepare caviar, and with a little experience almost any fairly intelligent person can do it, and it is to be hoped that some of our fishermen will turn their earnest attention to this matter.

The balance of the offal would make excellent fertilizer and oil. A few unthinking persons have blamed the cannerymen for not having done this years ago, but they must be acquitted of most of the blame. For once American inventive genius lagged behind. In the East, where the preparation of fish scrap and oil from nonedible species is an old and important industry, large plants have been established for the rendering of the fish. On this coast, where nonedible species are rare, fish offal has been the usual source of supply, and as the packing establishments are generally scattered widely, large plants could not be utilized owing to the heavy expense of bringing the offal such long distances. As a result, a small plant, capable of handling the refuse of a plant packing from 50,000 to 100,000 cases, was needed, and this has not been available at a reasonable cost until within the last two years; but as most of the ventures in this line in the past have been failures, the cannerymen are chary of investing until they see such a plant working successfully upon this material alone.

Mussels. Dr. Smith has told us in a recent circular issued by the United States Bureau of Fisheries that we ought to eat the sea mussel. I am happy to inform him that in a limited way this bivalve has for some years been marketed at various places on this coast, but there is room for an immense increase in its consumption. Large beds are frequent along this coast from San Francisco north, especially in Alaska. H. E. Westbrook has recently started to can them at his plant on Smith River, in northern California, and if the product takes well with the consuming public, others will undoubtedly take it up. Canning mussels would be a good business for the salmon canneries to take up when the salmon are not running.

Mussels are also valuable for the production of fertilizer, the so-called "mussel mud" constituting one of the best fertilizers known. It is found in places where the mussel beds are exposed to constantly depositing silt, which slowly destroys the mollusks and buries them beneath their offspring.

Clams. Clams are abundant throughout Alaska. I have personally found them in nearly every section outside of the Arctic, and it is credibly reported that there are large beds along the Arctic coast. The razor clam (*Siliqua patula*) is especially abundant in southeast and central Alaska. The mud clam (probably *Panopæa generosa*) is to be found in the same regions. Almost no use is made of them at present, but some day they will prove a source of wealth to the territory. The work of canning could easily be carried on at plants erected adjacent to the grounds.

Cockles. Beds of cockles, sometimes called scallops in Alaska, are known to exist in Funter Bay, on Admiralty Island, and in Dry Strait, near Wrangell, in southeast Alaska, and would probably be found in many other places if systematic search were made. They are eaten, but not sold.

Crabs. Crabs are exceedingly abundant in Alaska, and for many years the residents have been catching and eating them. In 1909 the business of catching and shipping them to Puget Sound was first undertaken. In the beginning all were shipped alive, packed in seaweed, but so many died on the way or arrived in bad condition that finally all were boiled before being shipped. They were shipped during the

Fig. 40. Mussels on rock near Crescent City, Del Norte County, California. These shellfish form a valuable food supply which has been little utilized up to the present.

summer months when a close season on Washington crabs prevailed. Owing to certain peculiar conditions prevailing on the Sound in 1913, none were shipped from Alaska.

Owing to the cheapness and abundance of the canned crabs imported from Japan, the business of canning them has languished on this coast, but as crabs are said to be decreasing in Japanese waters it may be that eventually our packers will be able to do some business in this line.

Shrimps and Prawns. These crustaceans are in quite general use in the coast states, but their pursuit has been neglected in Alaska.

Shrimps are found in a number of places in southeast Alaska, being fairly abundant at times in the vicinity of Wrangell, while the investigations of the Albatross have shown that they are abundant in the waters of central Alaska, south of the Alaska Peninsula. Last summer, during

the month of July, I found large numbers in the stomachs of codfish delivered by the fishermen at Pirate Cove, on Popof Island, in the Shumagin Islands. They have been reported from a few places in western Alaska. As the discovery of the presence of shrimp in Alaska has been what we might term accidental, it is probable that other, and even more prolific, grounds would be found if sought for specifically.

Prawns have been found in southeast Alaska, in the vicinity of Wrangell. Some prospecting was done in 1909 and a few of these crustaceans, known to the fishermen of Puget Sound as "big-spots" (which average five inches in length), "coon-stripes" (two inches in length), and "pinks" (one to one and a half inches in length) were gathered. As this was the first and only effort, so far as my knowledge extends, ever made to find these crustaceans in Alaskan waters, it is my belief that more extended search would disclose them in abundance in other sections of the territory.

Whale Meat. In Japan, whale meat is of considerable economic importance as a food product, the tail and adjacent parts and the soft piece under the eye being the choicest portion. It has much the flavor and appearance of beef. There are several whaling stations in operation on this coast, nearly all of which ship the portions mentioned to Japan. Could the prejudice against whale meat be overcome, it would prove a most important addition to our national larder.

Hair Seals. Many thousand of hair seals frequent this coast, especially in Alaska, and if properly hunted, I believe the industry could be made a profitable one, as the hides make excellent leather. A considerable reduction in the numbers of these animals would greatly benefit the salmon industry, as they annually destroy millions of these valuable fish.

Sea Urchins. The sea urchin, which is quite abundant on our coast, will some day be an article of economic importance. A few are gathered and the meat eaten by Japanese in California and by natives in Alaska.

Sea Cucumber. The Holothurian, known commonly as the sea cucumber, is a very abundant animal on this coast, but no use is made of it as yet. In the South Seas immense quantities are prepared for market by boiling and smoking, the resulting product being known as beche-de-mer. It is highly prized by orientals, who prepare a most delicious gelatinous soup from these.

Algæ. Despite the fact that the seaweed resources of this coast are not surpassed by those of any other, they are practically ignored. A number of native tribes gather, prepare and eat considerable quantities of seaweed, while small quantities are prepared by the oriental fishermen operating along the west coast for food, medicine and fertilizer.

Dulse (*Rhodymenia palmata*) is quite common on our northwest coast, and is an article of diet among the Washington and Alaska natives. The natives of Alaska usually gather dulse in the summer, dry it in the sun, press it in boxes, and then put it away for winter use. Other species of this genus grow on the west coast, while several other algæ known as dulse in Europe and used in the same way as Rhodymenia are represented by various species on our west coast. Dulse is frequently eaten as a relish in New England by the whites, and is also in quite general use in Ireland.

Vegetable isinglass could be prepared from *Gelidium corneum,* an alga which grows in abundance on our coast; this species is identical

with the one from which the Japanese prepare their vegetable isinglass. Other species (*G. coulteri* and *G. cartilagineum*) exist on the coast of California.

One form of agar-agar, now so extensively used in making culture media in bacteriological work, could also be prepared from *Gelidium*.

Laver (*Porphyra laciniata*) is found in abundance along our entire coast, but is not collected, except sparingly, by Chinese, although large quantities are imported by orientals living in this country. Laver grows abundantly in bays and near the mouth of rivers. In Japan this alga is cultivated and most of the crop is sun-dried. The green laver, or sea lettuce (*Ulva latissima*), which is abundant on all our coasts, is eaten in Scotland, and is also eaten with meat or as greens by native tribes of our northwest coast.

The giant kelp (*Nereocystis lutkeana*) is found in great profusion on the Pacific coast from Monterey Bay northward. The natives of this coast have made considerable use of this alga, while curios are made from the various portions of the plant and sold to tourists visiting California.

In 1906 two professors of the University of Washington invented a process for making a product resembling citron from the giant kelp. When made from the bulb it was a difficult matter to detect the difference between it and the real citron. The flavor was, of course, artificial.

Numerous species of *Laminaria* exist on the northern part of this coast, and the only use to which the plants are now put is for fertilizer. Many of these could be prepared in various ways as food and would doubtless meet with an encouraging reception if properly introduced.

Many species of algæ, identical with or similar to those used in Scotland, France, and Japan in the manufacture of iodine, abound on our northwest coast, but are never used for this purpose, despite the fact that this country is a large consumer of iodine, and its preparation in crude form is a comparatively simple matter.

Nearly all marine algæ contain iodine, but a few have such a comparatively large quantity that they are used almost exclusively. The Atlantic kelp yields the highest percentage of iodine, while the Pacific kelp yields a much higher percentage of potash, five or six times as much as the Atlantic kelp.

During the extraction of iodine, algin, cellulose, dextrin, mannite, potash, chloride of potassium, and carbonate of soda are also produced. As this country imports annually about $13,000,000 worth of potash, all of which could be produced from seaweed, we are criminally wasting our resources.

As a direct fertilizer fresh seaweeds have been in use for many years by farmers living on or near the Atlantic coast, but very little use has been made of it in this manner on this coast.

Owing to its large content of water, the total quantity of fertilizing ingredients in plants is very small in proportion to the weight of the material. As the plants decompose rapidly and the water separates from them quickly, during which operations the fertilizing constituents, especially the nitrogen, waste away, it is important that the plants be used within as short a time as practicable after they have been collected.

Seaweeds have a mechanical action on the soil, tending to make it friable and binding its constituents together. They also have an advantage over barnyard manure in the freedom from seed of land weeds.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

July 20, 1917.

Let the interest be keen and new views will open up; new trees will grow; new birds will fly; new fish will swim and then will our gallery be filled with new and glorious pictures of Things Worth Seeing. —Osceola in *Forest and Stream, Feb., 1917.*

LEGISLATION.

Believing that many will be interested in the constructive legislation relating to fish and game passed by the 1917 legislature, there appears on another page a symposium giving the various new laws and changes in old laws affecting fish, commercial fisheries, and game. Conservationists should feel elated over the splendid advance made.

SAFETY FIRST DURING THE HUNTING SEASON.

Soon after this number of CALIFORNIA FISH AND GAME reaches our readers, the hunting season will have opened. Too much emphasis can not be laid on "SAFETY FIRST" measures. A glance at the record of hunting accidents for the past season, published in the last number of CALIFORNIA FISH AND GAME should be proof enough of this fact. Cut out the following "Safety First" card as suggested by B. A. Fedde (Recreation, Oct., 1915, page 192), carry it with you, and tack it up in your camp so that you may be constantly reminded:

REMEMBER!

The other fellow is probably dressed in brown or gray or black and may be creeping.

Put on your red coat before leaving camp.

No loaded gun lying around camp.

Don't go into the thickets.

Don't crawl or creep.

Make sure his horns are full four inches and branched. Then you won't hit a man; nor will you have a fine to pay.

Be sure you see and KNOW what you aim at.

Better carry home disappointment than a wounded man.

RULES FOR HANDLING OF LOADED GUNS.

There is a fundamental rule in the handling of loaded firearms which, if observed by all, would prevent hundreds of casualties every year. That rule is simply: "Don't point the muzzle of the firearm toward another person, especially when the gun is not loaded." If this rule is strictly observed, the other elements of danger in the handling of firearms are very remote.

Not one gun in a million will burst with the charge except from carelessness in allowing the muzzle to become clogged with mud, or a top wad may become loose from poorly-loaded ammunition. When used in a double-barrel gun, the concussion of the discharge of the first load may loosen the wad in the other barrel, which may lodge in the choke of the barrel. Don't buy cheap ammunition.

A person who shoots at an object without being absolutely sure of the character of the object should be declared "*non compos mentis.*" He is a menace to public safety, and needs a guardian.

Always remove the shells before entering the house or camp or before climbing into a vehicle. In crossing over a fence, if you don't remove the shells, first, lay the gun on the ground lengthwise to the post. In this way the gun is never pointed toward you in laying it down or picking it up.

Don't stand a loaded gun against a tree or a vehicle. Take the loads out of the chamber.

Always watch out for the other fellow. If he is careless, shun him as you would a plague. Real sportsmen would not kill or maim a person.—GEORGE NEALE.

OIL POLLUTION.

Some of the first constructive conservation work accomplished by the California Fish and Game Commission was that in connection with the pollution of streams.

For many years a great number of valuable fish were destroyed due to the immense quantities of refuse, sawdust, slag, chemicals and oils dumped into the streams of the state. The good laws now obtaining have been rigidly enforced and pollution of this kind is now infrequent.

Pollution of ocean waters, due to the pumping of bilge water and emptying of ballast tanks still continues. Not only do many sea birds fall victims to the oil on the surface of the water, but this oil also destroys the plankton used as food by many valuable food fishes. Pollution of this kind is much in evidence near the Farallon Islands, and it is no uncommon sight to see hundreds of murres and other sea birds which nest on the Farallons so saturated with crude oil that they are unable to fly.

We are reliably informed that the Standard Oil Company has taken measures to stop this sort of pollution, and that there has been a resultant saving of oil rather than an increase of expense. It is necessary that immediate pressure be brought to bear on other oil companies so that similar preventive measures may be instituted. Any steps taken to reduce oil pollution in the waters along our coast will not only benefit the sea birds, but will be a conservation measure of direct effect on our supply of food fishes.

OUR PART IN THE CRISIS.

We wish to call to the attention of our readers pertinent sentences which appeared in a statement recently issued to farmers by President Woodrow Wilson. The present crisis demands thoughtful action on President Wilson's suggestions.

"This is our opportunity to demonstrate the efficiency of a great Democracy, and we shall not fall short of it!"

"The supreme test of the nation has come. We must all speak, act, and serve together!"

Cannot these suggestions be followed in efforts to conserve our wild life as well as in the endeavor to conserve other natural resources?

PREVENT WASTE.

As soon as there is a noticeable food shortage, attention is immediately directed toward wild life as a food supply. Most of the European countries at war have fortunately prevented extermination by passing rigid laws. In the present crisis it is very important that every tendency to abandon temporarily the seasons and bag limits on game should be quashed. Maximum use should be made of wild birds and animals, but the future as well must be considered.

Every hunter and fisherman can do his part in helping solve the food problem by preventing waste. Waste is always criminal, but it is doubly so at the present time. The man who kills a deer far from camp and is too lazy to see that the whole carcass is used for food, should be subject to fine and imprisonment. By salting part of a limit catch of fish all can be used as food.

It is to be hoped that every hunter and fisherman in the state will take sufficient interest in "preparedness" to see that every deer and duck shot, and every fish caught, is utilized for food. In so doing it will make possible the shipping of other foodstuffs from this country to the allies.

WILD LIFE AND FOOD.

The necessity for an increased food supply is turning the attention of everyone to the prevention of waste and the further utilization of undeveloped resources. Not only are methods of increasing crops being studied, but also methods of utilizing such natural sources of food supply as fish and game. An important committee, working under the direction of the Council of Defense, appointed by Governor Stephens, has as its problem the better utilization of the natural food supply represented in the products of the sea and of the game covers. The committee is composed of Dr. Barton W. Evermann, director of the California Academy of Sciences, chairman; Professors Kofoid and Ritter of the University of California, Professors McFarland, Snyder and Starks of Leland Stanford Junior University, W. C. Crandall of the Scripps Institution for Bilogical Research, N. B. Scofield and Dr. H. C. Bryant of the Fish and Game Commission.

This committee plans to study every angle of the problem. In the first place, an inventory of the natural food resources of the land and sea, including deer, ducks, fishes, mollusks and crusta-

ceans, will be taken in order to determine what species and what amounts are used at the present time or can be used each year. Then a study will be made of those fishes, birds and animals not now used, but which might be utilized as food, and ways will be devised for educating people to the value of new products of the land and sea and means of marketing the same by some cooperative method. Although 100,000,000 pounds of fish were marketed in this state during 1916, yet we have not yet fully utilized our fishery resources.

annual catch of fish and the take of game so that an inventory of the natural food resources of the state may be at hand. This is just the kind of data that has been collected by the Fish and Game Commission and all of it will be placed at the disposal of the committee.

The Department of Commercial Fisheries of the commission has been investigating the fishing methods employed and the methods of canning and curing. Furthermore, detailed information concerning the commercial fisheries has been

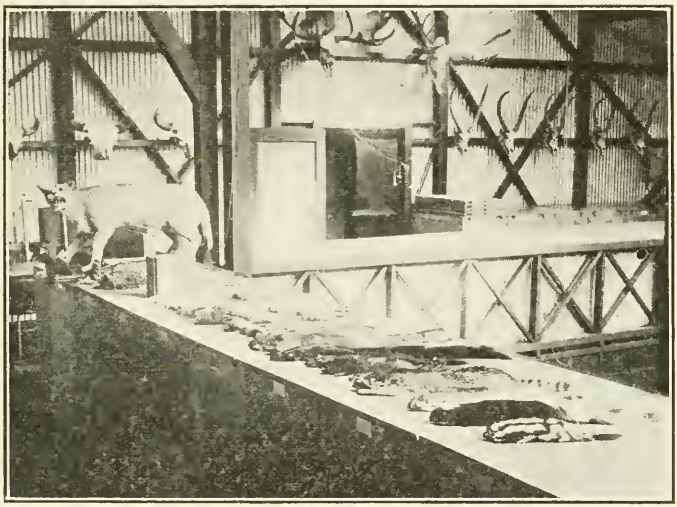

Fig. 41. Exhibit of "Common Mammals of the Forest" prepared for the Forest Service when in district convention at Berkeley, January, 1917. This is one type of the educational work being done by the Bureau of Education, Publicity and Research.

We kill 12,000 deer each year, but a large part of the venison so obtained is not properly utilized. The same can be said of the hundreds of thousands of ducks and geese killed each year. One of the serious problems of the committee will be to study means of preventing waste.

The California Fish and Game Commission, in whose hands is placed the administration of the wild life resources of the state, has been collecting data as to the abundance and yearly take of the various species of fish and of game. These data are of great importance at the present time. The committee on scientific investigations working under the Council of Defense is anxious to obtain information on the amount and value of the

collected with the ultimate object of aiding in the development of latent fishery resources and at the same time conserving the marine species upon which these industries depend. A law enacted at the last legislature requires dealers and handlers of fish to make an accurate monthly statement of the quantity and varieties of fish handled and of where they were caught. These data not only show the actual catch from month to month, but also the decline and rise of any fishery and the season of each variety of fish. The information now available on fish marketing problems, the sanitary handling of fish by fishermen and by markets, the cold-storaging of fish, the utilization of fish waste for fertilizer or for chicken feed will be of great service

in solving the food problem confronting the nation in this crisis.

Similarly, the Fish and Game Commission has made available through its game research department statistics on the annual kill of deer, rabbits, ducks, geese and other game. Data on the shipments, on the amounts sold in the markets, and on the wholesale and retail prices have also been obtained. Consequently, the Council of Defense has at its disposal many of the necessary facts and figures necessary to launch the scientific investigations.

The Fish and Game Commission is cooperating with the committee on biological investigations even to the extent of detailing certain men to devote most of their time to work which will be a direct aid to the committee. A wider and more efficient utilization of the fish and game resources of the state for food can be expected.

THE COST OF FISH AND GAME CONSERVATION.

The California Fish and Game Commission has sometimes been called extravagant because of the sums of money spent in administering fish and game resources. When such criticism is made the person forgets the fact that California is a very large state and that a very large portion of the funds received from the sale of hunters' and anglers' licenses must be utilized in properly patroling the state. California is 3.2 times as large as New York. New York employs a much larger number of wardens than we do and pays them smaller salaries. In addition to the administrative expenses of the department, included in another sum, New York spent during the fiscal year ending September 30, 1912, $287,081.99, a sum in itself about equal to the total spent in a state over three times as large. If you are not convinced that the administration of a resource bringing in an annual income of millions of dollars needs the sums invested, read the biennial report of the commission, and note the summaries of convictions, number of fish reared in the hatcheries, and the results of the other activities.

AN ALIEN FIREARMS BILL.

There was introduced in the 1917 legislature a bill prohibiting the ownership or possession of firearms, or the sale thereof, to any unnaturalized foreign-born resident of the state of California. In spite of the fact that a similar law exists in Pennsylvania and several other Eastern states, where it has been found valuable, it failed of passage. Had this measure been passed, two things could have been expected: first, there would have been fewer violations of the game laws, and second, there would have been fewer murders. Records of the Fish and Game Commission show that nearly half of those arrested for violation of the game laws are aliens. For example, the number of arrests of native born and aliens between July 1, 1916, and December 31, 1916, was as follows:

Native born	238
Alien born	181
Nationality undetermined	42
Total	461

A search of the criminal records would show that a large percentage of the murders occurring in this state can be attributed to aliens. Certain it is that those deputies of the Fish and Game Commission that have been shot down while doing their duty have almost invariably been killed by aliens. A bill which would have meant much to fish and game, and one which would have greatly reduced the number of murders committed in California, failed of passage.

BOYS INJURE FISHING.

Heretofore, many small boys who have begun fishing before the opening of the season have escaped prosecution on account of their tender years. It has now been found that many streams have been almost depleted by small boys before the legal opening day. Not only do these boys fish before the season opens, but many of them are guilty of exceeding the bag limit.

During the latter part of April, Deputy Henry Lencioni arrested Fred Mason and Claude Congleton, aged eleven and twelve years, respectively, on Mill Creek, in Sonoma County, for having in their possession a total of 163 trout. The fish were confiscated and the boys will be prosecuted.

Such occurrences are not uncommon. It is needless to say that they can not be tolerated and parents of young boys

who are violating the law are warned to take notice of this decision on the part of the officials having in charge the enforcement of the fish and game laws.

BIRD FOUNTAIN DEDICATED.

An event which marks a new interest in bird life of California was the dedication last June of the new St. Francis fountain on the boundary of Riverside and San Diego counties. This fountain, which was dedicated as a perpetual drinking place for animals and birds, was secured largely through the efforts of the Landmarks Club and the Riverside Humane Society, although it is a part of the municipal bird sanctuary surrounding Mt. Rubidoux. The fountain is a beautiful piece of architecture and the first of several similar works which the Landmarks Club proposes to erect in various parts of southern California.

Today, the two hundred and fifty acre tract on which rises Mt. Rubidoux, world-famous for the annual Easter Sunrise Service held on its summit, is a bird sanctuary. Its hitherto treeless soil now nourishes 50,000 young trees. California has more than five hundred varieties of birds and thousands of them may here nest and live unmolested and unafraid.

And that their needs may be still further supplied the western lower slope of the mountain has been artificially supplied with a stream of clear, sparkling water. Down, down the rivulet trickles—now a misty foam, now overflowing a pool. Again, a deeper hole is filled, and always the primary purpose of providing drinking and bathing places for the wild birds is carried out.—*Our Animals*, March, 1917.

Fig. 42. Feeding time at the State Game Farm, Hayward, California. Photograph by W. N. Dirks.

FIVE MEASURES FOR INCREASING GAME.

At the annual meeting of the American Game Protective Association recently held in New York emphasis was placed on five principal measures on which the

country must chiefly rely for bringing back its game. They are:

1. A thorough organization of the sportsmen.

2. The setting aside of areas in rural districts in which game will be inviolate, thus preserving the seed stock.

3. The breeding of game in captivity.

4. The provision of food, particularly in winter.

5. Systematic warfare on vermin.

THE USE OF THE LICENSE FUNDS.

During each session of the legislature envious eyes are cast on the fish and game protective funds. There appear to be certain men who wish to take over part of the funds furnished by the hunters and fishermen of the state to be used for good roads or for other state purposes. No one who has studied the situation can possibly see justice in any such move. Funds for the conservation of fish and game are furnished by those who make the most out of that natural resource and they will carefully guard the treasury to see that every cent of money so contributed is used for the protection and increase of those birds, animals and fish hunted for food and for sport or those of economic value. If the money secured by the sale of hunting and fishing licenses is not being properly used, recourse can be taken to improve conditions. However, so long as funds are raised by means of a special tax, they must be used for a specific purpose.

WINTER vs. SUMMER FURS.

Mr. E. R. Skinner of Sacramento, the largest fur buyer on the Pacific coast, recently stated that last year he paid $2.50 for the pelts of five fishers killed during July near Placerville, California. The trapper thought he was badly treated to receive but $2.50 for the five furs. When Mr. Skinner tried to sell these furs, the buyer threw out two of them as being of no value and paid fifty cents apiece for the other three. Mr. Skinner therefore lost one dollar in the operation. He stated that these same fishers if they had been trapped in winter, would have been worth, at the least calculation, $200. Is this not convincing evidence of the need for protective laws for the fur-bearers during the summer when their fur is of no value?

A trapper's license law passed by the 1917 legislature goes into operation in August. The law requires a license costing one dollar of every person trapping furs for profit and at the same time protects the more valuable fur-bearers during the summer when the fur is of no value. A further provision requiring a report of the number of fur-bearing mammals taken will furnish a basis for additional conservation measures.

DISCONTINUE PRIZES FOR FIRST DEER OR FIRST LIMIT OF FISH.

For several years past a number of valuable prizes have been offered by sporting goods houses in Los Angeles for the first deer of the season, and for the first limit of fish. The incentive to win these prizes has often been the cause of violation of the law. The beginning of the fishing season this year witnessed the arrest of a man at Bear Lake, San Bernardino County, who had attempted to secure a limit by unfair means. The sporting goods houses concerned, now convinced of the dangerous incentive to break the law given by the offering of such prizes, have decided to discontinue them.

HIGHER BOUNTY TO BE PAID ON MOUNTAIN LIONS.

The relatively small kill of lions during the past few years and the constant complaint by lion hunters that the bounty was insufficient to make the lion hunting worth while has led the Fish and Game Commission to increase the bounty on female lions from $20 to $30. The new bounty will be in effect after July 1, 1917. All claimants for the bounty will be required to send in the entire skin of the animal with the evidence of sex attached. In cases where the sex can not positively be determined, only $20 will be paid.

It is hoped that this increase of bounty will develop sufficient incentive to so control the number of mountain lions that their effect on deer will be negligible.

RESULTS OF COYOTE DESTRUCTION.

The recent campaign for the extermination of rabid coyotes in Modoc and Lassen counties waged during 1916 by the Forest Service, the California State Board of Health, the Federal Health Service, and the Biological Survey resulted in the destruction of 2,707 coyotes and 178 wild-

cats. In addition, county records show that during the same period bounties were paid on 1,474 coyote scalps. Figures compiled by the State Board of Health indicate that 362 head of cattle, 39 head of horses, 233 sheep, and 18 swine died from rabies or suspected rabies during this period. Hundreds of head of stock found dead are also supposed to have died from rabies, but proof was not positive. Laboratory examination of the brains of 127 domestic and wild animals gave positive tests of this disease.—*Weekly Bulletin of Forest Service*, Feb. 24, 1917.

Fig. 43. The deer season opens on August 1 in Districts 2 and 3, two weeks later in other districts. Bucks with branched antlers alone can be shot. Photograph by W. N. Dirks.

PELTS PROVE VALUABLE.

Coyote pelts are worth $8 each, for fur, as well as $2 bounty, in Tulare County. J. C. Frazier, of Tipton, appeared at the Tulare County Court House recently with 51 pelts, to collect his bounty. He also stated that he had a market for all the pelts he could get. The pelts were tanned and ready for shipment and were worth over $500.

Eastern furriers have found that the pelts, after they are dyed, make splendid substitutes for some of the more expensive furs, as the hair is firm and of good length.—*The Joaquin*, March, 1917.

HOW TO DRESS A DEER.

Under ordinary circumstances a deer should be dressed on the spot as soon as killed, as this insures that there will be no bloating, and also makes possible thorough bleeding. Do not cut the deer's throat.

My method is based on the presumption that the work will be done by one man. By following it the danger of getting hair and foreign substances will be minimized. Remove all blood with a dry cloth, never use water, which hastens decomposition:

1. Place the carcass in a slight depression on the side. Roll your sleeves to the shoulders and pin them up.

2. Lift tail and make an incision completely around the anus with a sharp knife, cutting through to abdominal cavity.

3. Grasp posterior end of large intestine released by this incision with one hand (by wrapping a piece of cloth around the intestine a better grip will be secured) and pull it far enough out to tie a string about its end. Some additional cutting will probably be necessary as the intestine is pulled out. The object of this operation is to keep the carcass from being fouled during subsequent movements.

4. Turn carcass on back and, standing astride of it, with legs just back of the shoulders and facing the tail, make an incision from the median line adjoining the thorax large enough to admit two fingers. With a knife placed between the index and adjoining finger make a clean, straight cut down the median line to a point within approximately four inches

of the root of the tail. In this operation the fingers are employed in holding up the wall of the stomach so that the knife will not cut the paunch or entrails.

5. Turn carcass on side. Grasp it by tail and neck or horns and pull it out of depression, so that paunch and entrails will fall into spot formerly occupied by the carcass. The organs must be cut loose with a knife, but care should be taken not to perforate them.

6. Remove diaphragm by cutting around outer edge. Next remove the œsophagus by severing as near to the upper end as possible. Heart and lungs will come with the œsophagus, as they adhere to it. This completes removal of internal organs. Sweep out collected blood with palm of hand.

7. Hang carcass by head or horns. This is difficult for one man to do if the deer is large, and in most instances help will have to be secured. It is better to do the hanging in a shed where there is a draft, than in the woods.

8. Place a skewer to keep the incision open and permit escape of body heat. Cover whole carcass with mosquito netting, cheesecloth, or burlap, in warm weather when flies are present. When *rigor mortis* sets in, the body heat is gone and the carcass is ready for shipment.

9. To prepare for shipment examine mouth, nostrils, eyes, and bullet holes for eggs of flies. Sew up carcass with sail needle and light twine, taking care to close vent and all bullet holes. If the state law requires it, affix tag to carcass and comply with all other legal requirements. If the weather is moderately cool and the shipment will not be more than twenty-four hours, icing is not necessary. If the temperature exceeds sixty degrees the carcass should be partly filled with lumps of ice varying in size from a lemon to a large orange. This is done, of course, before sewing up. Weigh carcass before putting in ice. Shipping tags are attached to horns or to a slit in the ear. All shipments should be made by express.—JOHN B. BURNHAM in *American Game Protective Association Bulletin*, May 1, 1917.

THE HUNTING INSTINCT.

To insist that all hunting and killing of game birds is wrong is to maintain that one of the most deeply planted instincts of the masculine human nature is a perversion. The primitive races of men found their means of livelihood largely through hunting, and success in life was conditioned upon strength, endurance and skill in the hunt. A large majority of perfectly normal boys still, and perhaps ever will, pass through a period of their individual development when the hunting instinct is dominant and must be properly directed or gratified if the boy is to develop those hardy, alert and vigorous qualities which are of prime importance in the making of a man. Annually thousands of mature men, weary and worn by the strenuous and often unnatural toil of modern civilized occupations, find in the pursuit of game birds the allurement which leads them to forsake business for a few days and betake themselves to the health-giving influence of woods and fields. Here in the haunts of the game birds, in contact with the elemental forces of nature, engaged in a pursuit which requires vigorous physical activity and absolute forgetfulness of other affairs for success in the sport, they find relaxation, rest and recuperation.

Much of the disrepute associated with hunting and hunters has arisen through the disregard by some thoughtless or inconsiderate men of the property rights of those on whose land they are hunting and through a failure to restrain their immediate self-interest for the larger good of the community. Men must learn to be content with a reasonable bag of game, at least with that number which corresponds with the consensus of public opinion as indicated by the legal limit. Men may learn that the pleasure and benefit to be derived from the hunt are not conditioned upon unlimited slaughter, but rather upon the associations and enjoyment of natural surroundings which the hunting season affords. Many boys and men have learned that even great pleasure and benefits may be derived from the study and photographing of the living birds, because of the much higher degree of hunting and stalking skill required, because of the larger opportunity which this affords for real acquaintance with the bird and its habits and the even more attractive and valuable trophies which they have to show.

A public-spirited, far-sighted policy requires that the splendid natural resources be maintained not only for the enjoyment of the present generation but passed on

unimpaired to succeeding generations so far as this is possible in civilized communities and consistent with agricultural interests. Here again there is the great need for the development of an enlightened public sentiment so that as individuals and communities we shall neither exercise nor tolerate that spirit of unlimited destruction of game which has led to the practical extermination of game in many places and is so seriously reducing the numbers of many of our game birds, but rather devise ways and means to increase and perpetuate them.—*The Extension*, Nov., 1912, Vol. 6, No. 11. Guide for North Dakota Bird Study, pp. 5–6.

DEEP SNOWS CAUSE STARVATION OF MANY YELLOWSTONE ELK.

Alarming reports of conditions which threaten decimation of the Yellowstone elk herds are beginning to reach the Department of Agriculture, both from the Jackson's Hole region and from Gardner, Montana. The danger is said to be due to an exceptionally heavy winter snowfall and late oncoming of spring. Deep crusted snow is preventing the elk from obtaining their usual feed and the weakened animals, especially the calves, are reported to be dying rapidly in spite of the large supply of hay provided by the federal government for such emergencies. This supply, however, has been exhausted.

The elk which winter around Jackson's Hole, in Wyoming, are known as the southern or Jackson's Hole herd and number more than 20,000. The northern or Park herd is estimated by the Park authorities to contain over 30,000 animals. According to the reports received by the Forest Service the losses in the southern herd may reach even as high a figure as one-third the entire number, with practically an entire loss of last year's calves. In the northern herd conditions appear to be less critical, but an immediate spring break-up is eagerly hoped for by those interested in seeing the elk preserved.

"When I left Gardner about three weeks ago," said Charles Sheldon, the explorer and naturalist who was selected by the government to represent the sportsmen in the elk census attempted this spring, "the elk that I saw seemed on the whole not in bad condition for this time of year except the calves, many of which were pretty weak. But the snow was unusually deep and the elk widely scattered in search of food. I understand it has been snowing since I left and that considerable losses are thought probable. The winter has been extremely severe and both elk and domestic live stock are bound to suffer under such exceptional conditions. Because of the depth of the snow it was impossible to make the elk census that we had planned.

"Ordinarily there isn't enough snow to prevent the elk from getting at their feed. This winter, however, a succession of storms has piled the snow up, with the result that the animals have become weakened by prolonged starvation. At Jackson's Hole the Biological Survey had over 600 tons of hay available for feeding the elk, but I understand the supply is now exhausted.

"In most places feeding the elk is out of the question. Hay costs around $40 a ton and it is almost impossible to get hold of any at that price. The cattle and sheep men are unable to secure enough to feed their stock and will, I am told, probably suffer heavy losses. Even if unlimited amounts of hay could be had there would be no way to get it to the elk, since the roads are impassable."

Officials of the Department of Agriculture point out that, deplorable as are the losses which the elk herds are now suffering, the situation is not essentially different from that created among domestic live stock by seasons of unusual severity. The natural increase will, they say, gradually bring the herds back to their former size if they are properly protected. Both the Forest Service and the National Park Service are deeply interested in the perpetuation of the elk, and are working together in an effort to find a consistent, workable conservation policy.

THE FIELD THAT SILAS PLOWED.

This is the field that Silas plowed.

This is the corn that grew in the field that Silas plowed.

This is the bug, prolific and smug, that destroyed the corn that grew in the field that Silas plowed.

This is the bird of joyful song, that ate the bug, prolific and smug, that destroyed the corn that grew in the field that Silas plowed.

This is the cat, stray and forlorn, that killed the bird of joyful song, that ate the bug, prolific and smug, that destroyed the corn that grew in the field that Silas plowed.

This is the field that Silas plowed—deserted by birds of joyful song, swarming with bugs, prolific and smug, yielding but half a crop of corn, roamed by the cat, stray and forlorn.—*The Conservationist*, February, 1917.

NATURE STUDY OUTLINE FOR ELEMENTARY SCHOOLS.

In an endeavor to furnish the nature study teacher with a useful outline of work for the whole year, Miss Gretchen L. Libby, supervisor of nature study in the public schools of Santa Barbara, and formerly educational assistant for the California Fish and Game Commission, has published a bulletin of 26 pages. Miss Libby has had wide experience in nature study work and her contribution to the teachers of the state when connected with the Fish and Game Commission has been widely used. The edition of this publication, "Bird Study in the Public Schools," has long since been exhausted, and it is fortunate that there can now be recommended a valuable substitute. The purpose of nature study is thus defined in the introduction:

"(1) To arouse an interest in the out-of-doors, and to lead the children to a first-hand knowledge of the common forms of plant and animal life as seen about them. (2) To develop a sympathy toward nature, and a regard for the value of life. (3) To train the powers of observation, and to teach the children to observe accurately. (4) To lead them to see the interrelation of plant and animal life, and its economic value to man. (5) To guide the pupils into a feeling of comradeship with nature, which will furnish them with a wholesome and healthful means of spending their leisure hours."

The outline is arranged in such a way that definite work is suggested for each grade and for each month in the year. The subjects covered are correlated with the time of year. Caterpillars are to be studied when they can be obtained. Winter birds are to be studied when they are present in number. The living things associated with Thanksgiving are studied in November, and the work for December is grouped about Christmas and its festivities. Studies of plant life, of animal life and directions for field work are included in the work of each month. Suggestive outlines for special study and a fine list of references are appended.

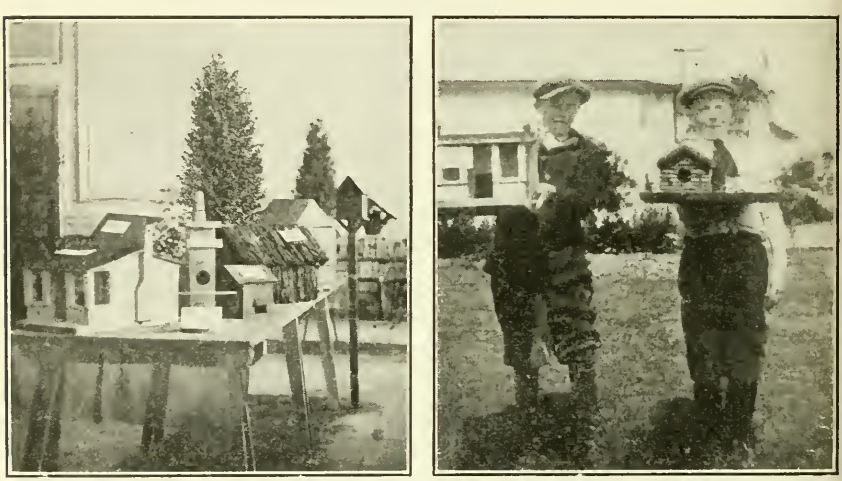

Fig. 44. Exhibit of bird boxes and winners of contest held by Playgrounds Department of Berkeley, California. Such contests as this stimulate interest in bird study. Photographs by T. J. Storer and G. Schneider.

THE REAL SPORTSMAN.

Among sports and pastimes, hunting, shooting and fishing are considered the world over, as being most desirable and suitable forms of recreation, and for centuries past have provided healthy exercise, pleasure and profit for all classes of people. The real sportsman who believes in legitimate hunting within reasonable limits, and who, for success, depends upon his own skill, courage and endurance, is invariably a true gentleman in every sense of the word. Included in this class are some of the greatest and best men who have ever lived, and among them are those to whom the world will everlastingly owe debts of gratitude for valuable services rendered to humanity. Most of the world's famous scientists, explorers, missionaries, statesmen, educators and other prominent men, were renowned in their day as fearless hunters, keen sportsmen, or excellent anglers.

The true sportsman is possessed of a natural love or inclination for hunting, shooting and fishing, and he is not influenced by selfish interests, mercenary motives, personal gain or commercial considerations. The best class of sportsmen are always in favor of game protection and the enforcement of reasonable game laws. They cheerfully comply with the hunting regulations themselves, and realize that it is impossible to frame laws that will suit all parties and all sections. Above and beyond all, the real sportsman is in favor of giving the wild birds some kind of a fair show, and a square deal, for he well knows that they are at a great disadvantage, not only in the field, but also on account of not being represented when bird and game laws are being considered, or when bag limits and open and closed seasons are being discussed. The success or failure of our game protection laws depends largely on the kind of men behind the guns. Law or no law, the right-minded sportsmen, old and young, do not need restrictive legislation to control their actions, or regulate their hunting and fishing methods, and there would be no need of game wardens, if the majority of so-called sportsmen were earnestly and honestly in favor of game and fish protection and preservation.—H. P. ATTWATER, *Bull. Sci. Soc. of San Antonio*, Vol. 1, pp. 56–57.

BOTS WANTED.

The Bureau of Entomology is prosecuting, under the immediate direction of Dr. C. H. T. Townsend, a detailed investigation of bots of American large game animals, and especially of those which occur in the head and throat. The latter have been found in the nasal and frontal passages, pharynx, larynx and gullet of deer, wapiti, caribou and pronghorn; and there is a possibility of their occurrence also in moose, mountain sheep, mountain goat and even musk ox. The greatest service can be rendered in this connection by persons who have opportunity to examine freshly-killed carcasses of any of the above animals. Material is desired from every section of North America.

The flies which are the parents of these bots are very rarely seen and are but little known even to entomologists. They can be reared from the mature bots by exercising proper care. The best chance of finding mature bots in game heads appears to be in winter or early spring. Such bots should be packed alive in loose dry earth in strong tin or wooden receptacles, the package being well wrapped in several thicknesses of stout paper and firmly tied, or sewed in cloth or canvas, before mailing. This office will make every effort to rear the flies from such sendings.

If bots are found which do not appear to be mature, they may be dropped in spirits in a wide-mouthed bottle, packed in a strong receptacle with cotton or other yielding substance, and mailed. Such material is needed for study purposes. If any bots should be found beneath the skin, in the stomach or intestines, or in any other part of the body, they will be equally acceptable.

Assistance rendered will be greatly appreciated and duly acknowledged in reports that may be published on the material secured. Each lot of material should be accompanied by the following data:

(1) Locality where host animal was killed.
(2) Name of host animal.
(3) Part of body in which found.
(4) Date of securing the material.
(5) Name of collector.

—L. O. HOWARD, Chief of Bureau of Entomology.

HATCHERY NOTES.

W. H. Shebley, Editor.

PROSPECTS GOOD FOR A RECORD TAKE OF EGGS.

With the completion of the spawning operations at Brookdale and Snow Mountain stations, prospects for a record take of eggs are excellent. A total of over 20,000,000 eggs has been taken, to date, and egg collecting operations at the Rae Lakes egg collecting stations have not as yet been commenced.

MT. SHASTA HATCHERY.

Of the 6,000,000 quinnat salmon fry handled at Mount Shasta Hatchery this season, approximately 2,500,000 have been planted in the Sacramento and Klamath rivers. The balance have been transferred to either the large salmon rearing ponds or to the lakes at Mount Shasta Hatchery, where they will be held until after the first fall rains, when they will be planted in the upper reaches of the Sacramento and Klamath rivers.

The take of rainbow trout eggs at the auxiliary stations on the Klamath River was very satisfactory, and the fry resulting from the eggs taken will amount to about 2,500,000. Rainbow eggs will be shipped to Mount Shasta Hatchery from the egg collecting stations at Domingo Springs.

Black-spotted trout eggs from the Tahoe Hatcheries and steelhead eggs from Brookdale and Snow Mountain stations are being hatched at Mount Shasta Hatchery for distribution in the different sections of the state.

The 3,000,000 Loch Leven and eastern brook trout fry are doing nicely and are about ready for distribution. In all, approximately 11,000,000 trout fry will be shipped from Mount Shasta Hatchery this season.

TAHOE HATCHERIES.

Although the spawning season for the black-spotted trout in Lake Tahoe was very late this season, and it appeared at one time that the take would be short, reports now indicate that the season's take of eggs will be in excess of four million. All egg collecting operations are being carried on at the Tallac Station. A portion of the eggs will be shipped to Mount Shasta Hatchery and the new Mount Whitney Hatchery. About 250,000 rainbow eggs will be shipped to the Tahoe City Station from the Domingo Springs Station and the resulting fry will be distributed in streams and lakes of the Tahoe region. Black-spotted trout eggs will be hatched at both the Tahoe City and Tallac stations for distribution in the streams tributary to Lake Tahoe, as well as other streams and lakes of the Tahoe region. Streams of Alpine County will also be stocked with black-spotted fry from the Tallac Station.

FORT SEWARD HATCHERY.

All of the quinnat salmon fry were distributed from the Fort Seward Hatchery during the month of March. The fry were planted in Mad River, in tributaries of Humboldt Bay, and in Eel River and tributary streams.

Steelhead trout eggs to the number of 1,350,000 have been shipped to Fort Seward Hatchery from the Snow Mountain Station.

We are planning to ship approximately 150,000 rainbow trout eggs from Domingo Springs Station to Fort Seward Hatchery during the month of June. Both the steelhead and rainbow trout fry will be given a wide distribution in the streams of Humboldt County. It is also planned to stock a few streams in Del Norte and Mendocino counties from this station.

ALMANOR HATCHERY.

Egg collecting operations were commenced at the Almanor Hatchery on about March 1 and continued throughout the months of April and May. Owing to the fact that an average of nearly 600 second-feet of water was run through the spillway of the Almanor dam by the Great Western Power Company almost continuously during the spawning season, the volume of water passing through our fish racks was such that it was impossible for the spawning fish to ascend the stream. Only a half million eggs were taken at this station. However, the run of spawning fish is later in Rice Creek where the Domingo Springs Station is located, and our crew is making every effort to obtain enough fish to give

us an average take of eggs. The Domingo Springs egg collecting station is operated as an auxiliary station to Almanor Hatchery. At this date, June 1, the run of female trout predominates ten to one over the males, owing to the fact that there was such heavy fishing below our racks since the opening of the fishing season on May 1. The male fish enter the spawning streams first and consequently a greater proportion of the males were caught by the anglers.

SNOW MOUNTAIN STATION.

Snow Mountain Station was closed on May 30, after completing a very successful season's work. Although it appeared during the fore part of the season that our operations would be a failure, owing to adverse conditions of weather and water, the fish ran well during the latter part of the season, and in excess of six million trout eggs were taken. A quarter of a million eggs were hatched and the fry resulting were distributed in tributaries of the Eel River. The balance of the eggs were "eyed" and shipped to Ukiah, Mount Shasta, Fort Seward and Mount Whitney hatcheries, where they will be hatched and reared for distribution in the waters in those sections of the state where conditions are favorable for steelhead trout.

UKIAH HATCHERY.

A half million steelhead trout eggs were shipped from Snow Mountain Station and Ukiah during the latter part of May. The fry resulting from the same are doing nicely, and, when ready for planting, will be given a wide distribution in the streams and lakes of Mendocino, Sonoma and Lake counties.

BROOKDALE HATCHERY.

All egg collecting operations have been completed at the Scott Creek Station. This station produced a little over two million steelhead trout eggs this season. Approximately 900,000 eggs were hatched at Brookdale for distribution in the streams of Santa Cruz and Santa Clara counties, and the balance were "eyed" and shipped to Mount Shasta Hatchery, from which station the resulting fry will be distributed.

The eggs retained at Brookdale Hatchery hatched out well, and the first of the fry are now being distributed in the streams of Santa Cruz County.

BEAR VALLEY HATCHERY.

Bear Valley Hatchery was opened up during the fore part of March, and the fish commenced running into North Creek about the tenth of April in great numbers. Owing to the rising of the waters of Bear Lake about seven feet higher than in former years, which practically shut out the spawning fish from all other streams tributary to the lake, the fish congregated at the mouth of North Creek and entered the stream in large numbers. Facilities for holding eggs at our spawning station are limited and when the hatching troughs were filled, we were unable to take more eggs. A million eggs were taken, and after "eyeing" were transferred from the "eyeing" station to the hatchery where they will be reared for distribution in the waters of San Bernardino County.

MOUNT WHITNEY HATCHERY.

The work of preparing Mount Whitney Hatchery for fish-cultural operations is now nearing completion, and everything is in readiness for the season's work. From Snow Mountain Station, 750,000 steelhead trout eggs have been shipped to the hatchery and a consignment of 250,000 black-spotted trout eggs from Tahoe Hatchery will be shipped in a few days. These eggs will be hatched and the fry reared for distribution in the waters of southern California.

During the latter part of June or early in July when it is possible for our assistants to get through the Oak Creek pass, the Rae Lakes Egg Collecting Station will be opened up and it is expected that enough rainbow trout eggs will be collected to fill the Mount Whitney Hatchery to capacity.

WAWONA HATCHERY.

On May 11, the Wawona Hatchery, located near Wawona, Yosemite Valley, was opened up, after being closed since August, 1914. On May 17, a shipment of rainbow trout eggs was received from Mount Shasta Hatchery. The fry resulting from these eggs will be reared for distribution in the Merced River and other streams of that section of the Yosemite Valley.

FISH DISTRIBUTION.

The application list for the season of 1917 was closed on May 31. All fish available for distribution this season have been allotted, owing to the fact that so many applications were received from all sections of the state that it was not possible to carry any surplus supply at any of the hatcheries.

Distribution car No. 01 is now in the Southern Pacific shops at Sacramento for a general overhauling before commencing the season's work. It will leave the shops on June 9, and about June 15 will commence the distribution of trout fry from Mount Shasta Hatchery.

Distribution car No. 02 is being equipped for distribution work and is expected to be out of the shops about the middle of June, when it also will be put into service distributing fry from Mount Shasta Hatchery.

Fig. 45. View of new Mount Whitney Hatchery, showing tower. Photograph by J. L. Von Blon.

SCREEN AND LADDER SURVEYS.

Preliminary surveys have been made in the delta region for the installation of screens over the hundreds of siphon pumps now operated in many of the large

reclamation districts of that section. Considerable difficulty has been experienced in locating the owners of the different siphon plants, but recently procured charts give almost complete data relative to the location of the different reclamation districts and the owners of the majority of the large holdings in that section. A survey of a portion of Shasta County has been made, and efforts are being made to have all of the ditches and canals screened this summer.

Reports recently received from Modoc and Trinity counties indicate that the installation of screens is proceeding satisfactorily. Surveys of the installation of fishways in Napa, San Luis Obispo and Sierra counties are now under way and it is hoped that all fishladders will be completed by fall.

COMMERCIAL FISHERY NOTES.

N. B. Scofield, Editor.

THE FISH INDUSTRY IN CALIFORNIA DURING THE YEAR 1916.

For the year 1916 the wholesale fish dealers, packers and canners of California reported the receipt of 110,652,626 pounds of fish received from fishermen and fish taken by themselves. At an average price to the fishermen of four cents per pound, this would represent a value of $4,426,-105.04. There were 3,820 fishermen employed in catching fish during 1916, and the fishing boats used in the state fisheries were as follows: Boats transporting and collecting fish from the fishermen numbered 59 (all under 15 tons); boats fishing under five tons numbered 1,917; boats fishing over 5 tons and under 15 tons numbered 146; boats fishing over 15 tons and under 50 tons numbered 15, making a total of 2,137 boats and representing an investment of $2,445,710. The number of nets used by the fishermen, including all kinds, was 8,275, representing an investment of $620,729.

During the year 1916 there were, along the California coast and the inland waters, 101 fishery plants operated by wholesale dealers, packers and canners who either caught their own fish or received fish direct from the fishermen (dealers who received fish from wholesalers not included in this report, only wholesale dealers, packers and canners who either caught the fish themselves or received fish from fishermen). Seventy-one of these plants were operated by wholesale dealers, who furnish the trade with fresh fish, and 30 of the plants were canning and packing establishments where fish were canned, pickled, cured, salted, smoked or dried. There was invested in these plants $2,008,004, of which $1,348,647 was invested by the canners and packers and $695,357 was invested by the wholesale fresh fish dealers. There were 3,967 people employed in these plants, not counting the fishermen. Three independent reduction plants were operated in the state during 1916; that is, plants that were not operated in conjunction with canneries or packing establishments. These plants represented an investment of $107,000 and employed 62 people throughout the year.

Fish Canned.

The canned fish pack for 1916 was as follows: Tuna (albacore), 108,312 cases one-pound cans, 299,935 cases half-pound cans, 54,113 cases quarter-pound cans; deviled or potted tuna, 3,430 cases half-pound cans, 14,679 cases quarter-pound cans; tuna chowder, 1,000 cases (No. 1 Eastern oyster); sardines, 108,408 cases one-pound cans, 50,272 cases half-pound cans, 13,445 cases quarter-pound cans; salmon, 18,720 cases one-pound cans, 23,016 cases half-pound cans; shad, 27,167 cases one-pound cans; shad roe, 7,244 cases half-pound cans; bonito, 155 cases one-pound cans, 5,169 cases half-pound cans, 930 cases quarter-pound cans; yellowtail, 11 cases one-pound cans, 810 cases half-pound cans; mackerel, 133 cases one-pound cans, 3,035 cases quarter-pound cans; herring, 7,223 cases pound cans; anchovies, 201 cases quarter-pound cans; sea bass, 62 cases half-pound cans; miscellaneous fishery products, 1,182 cases half-pound cans, 856 cases quarter-pound cans; abalone, 5,889 cases one-pound cans.

Fish Salted, Smoked, Pickled and Cured. (Net Weight).

Salmon, mild cured, 2,024,584 pounds; salmon, hard salted, 4,600 pounds; an-

chovies, pickled, 625,600 pounds; shad, mild cured, 241,080 pounds; sardines, salted, 241,600 pounds; herring, pickled and cured, 188,200 pounds; tuna, salted, 19,000 pounds; tuna, smoked, 27,414 pounds; tuna, cured in oil, 2,000 pounds; tuna, frozen, 65,205 pounds; rock fish, salted, 18,845 pounds; barracuda, salted, 12,000 pounds; rock bass, salted, 3,000 pounds; sea bass, salted, 5,000 pounds; Spanish mackerel, salted, 19,000 pounds; yellowtail, salted, 8,000 pounds; bonito, salted, 1,000 pounds; miscellaneous fish, salted, 223,396 pounds.

Chicken Food, Fish Scrap, Fish Oil, Etc.

Fish oil, 32,082 gallons; fish scrap, chicken food and fertilizer, 4,494,136 pounds.

CIOPINO.

The ciopino (pronounced chipeno) is one of the simplest, healthiest and cheapest ways of cooking fish. Originated by Italians, it is cooked and eaten by them almost exclusively.

Ciopino is a great dish among the fishermen, some practically living on it because of its healthfulness and muscle-building qualities, and the ease with which it is prepared. When fishermen are out on trips for days at a time the only supplies that are taken are bread, wine, a little coffee and the ingredients that are used to make up a ciopino, depending on their luck to catch the needed fish. Butter is never used in the preparation of the ciopino, olive oil taking its place. There are a great many kinds of ciopino; that is, most of the people that cook it prepare the dish in a slightly different way. Sometimes it is what one might call fancy, shellfish, celery, parsley, wine, etc., being used in preparation. But the kind generally prepared by the fisher folk is very simple and inexpensive, the olive oil used being the most expensive ingredient. Some prefer salad oil, which is less expensive and not quite so rich. The large sized fishes are generally used in making the ciopino on account of the size of the bones. Most any of the larger sized ocean fishes, such as the rock fishes, rock bass, sea bass, halibut, and barracuda, can be used. The wings of the skate are highly prized among the Italian fishermen for a ciopino; striped bass are very fine. Several different varieties of fish are sometimes used. The ciopino is neither a roast, chowder nor a fry. In America, it would probably be nearer a pot roast than anything else. In preparing a ciopino the whole fish is used including the head, which contains some of the best part of the fish.

Ciopino, such as is made by the fishermen, is prepared as follows:

> For five people use from three to five pounds of fish sliced in fairly large pieces, then prepare one or two onions, depending on size, by chopping them up quite fine. Place in a stewpot one-half cup of olive oil (salad oil may be used) and add the onions, frying them until yellow, in the meantime adding several cloves, garlic, and a little parsley. Add a can of tomatoes (raw tomatoes may be used) and cook for about ten minutes. If potatoes are used (a great many never use potatoes in the preparation) they should then be added and cooked for five or ten minutes. Add fish, covering it well with the tomatoes, onions, etc., season with salt, and rather highly with pepper or paprica, put on the lid and let simmer until done. Don't stir. A little water may be added if desired. Serve in a deep plate. Ciopino may be poured over French or Italian bread.

Owing to the present high cost of living, the people should take advantage of the cheaper kinds of fish, which when properly prepared are just as good and represent just as much food value as the more expensive kinds. Get the ciopino habit and fool the butcher several times a week.—H. B. Nidever.

PREPARATION OF ABALONE FOR FOOD.

It is well to give here the process of preparing the abalone for food, for many have attempted to cook it, only to find it too tough to chew. Place the shell, top down, on coals or a hot stove for a moment or two, and the animal will be easily removed. Put the meat in a strong solution of lye, made from wood ashes mixed with a little water, for about fifteen minutes, then rub with a brush or cloth, when all the black skin will come off. After rinsing in water, slice into steaks about one-third of an inch thick. Place a slice between cotton cloth and pound it with some wooden implement until the fiber of the meat is separated; then boil, fry, or broil, seasoning to taste.—*The American Angler*, Spring, 1917, Number.

NEW COMMERCIAL FISHERIES INVESTIGATION.

In anticipation of the revenue to be derived from the new fisheries tax law, which will be available for fisheries investigation and patrol work, the Fish and Game Commission has secured the services of Mr. W. F. Thompson, a fisheries investigator of note, to conduct investigations on the commercially important fishes of southern California. Mr. Thompson assumed the duties of his new position on June 1 and will first take up the problem of the tuna, or albacore, which is about the most valuable fish of southern California and one of which we know the least. Mr. Thompson has had the best of training for his work. He graduated in zoology at Stanford University, where he made a special study of fishes with the view of fitting himself for fisheries investigation work. His first field work was a survey of the commercially important mollusks of the northern California coast, for the Fish and Game Commission. For nearly six years since then he has been employed by the British Columbia Department of Fisheries, where he made investigations of the clams, abalones, halibut and herring. His reports on these investigations have been published by that department. His several reports on the halibut place him in the first rank of fisheries investigators. We look forward with confidence that the work of Mr. Thompson will be of lasting benefit to the fisheries of the state.

CONSERVATION IN OTHER STATES.

OREGON MAKES NUMEROUS CHANGES IN GAME LAWS.

Oregon's last legislature took the position that legislation should favor game rather than the huntsman and fisherman, and as a result many conservation measures were passed. The more interesting improvements in laws are as follows:

(1) The bag limit on deer with horns has been reduced from three to two. The season has been changed and shortened.

(2) Chinese pheasant hens are now protected. Two years ago, on the insistence of many sportsmen, a law was passed allowing one hen in every bag of five, and two hens in a bag of ten.

(3) Hunting and angling licenses now cost $1.50 each, instead of $1.00.

(4) The bag limit on trout has been reduced from 75 to 50 trout in any one day.

(5) Game breeders are now charged a license of $2.00.

NEVADA AND THE MIGRATORY BIRD LAW.

Nevada has incorporated in its game laws a proviso stating that the open season on migratory game birds shall always automatically change so as to conform to the "Regulations for the Protection of Migratory Birds," as they shall hereafter be prescribed by the United States Department of Agriculture, Bureau of Biological Survey.

PHEASANTS IN MISSOURI.

While a few years ago it was publicly announced that of the many Chinese pheasants introduced or hatched and liberated in Missouri, none had survived the deep snows of winter and the guns of the farmers and hunters, I am now able to tell you that the members of the Horseshoe Lake Hunting and Fishing Club are positive that two coveys are on their private grounds of 1,000 acres in St. Charles County, 25 miles northwest of St. Louis. When first seen last summer the coveys consisted of about eight birds each of different sizes, but fully grown in October. Crowing of three males was heard by club members on the same day in widely separated places.

Six years ago 18 pheasants were received by the club from the state commissioner, but all but one disappeared. The one survivor, a male, was noticed from time to time on the grounds, but was neither fed nor molested. It was only last summer that it became apparent that he had found a mate and that they had raised young ones. It may be supposed that the hen came from the adjoining farming region, where some of the

farmers claim they knew of the presence of pheasants on their land ever since they liberated them about the same time the club did. It appears therefore that the Chinese pheasant has done better in acclimatizing than it has become generally known. It is conceivable that the farmers do not find it in their interest to make it known that they have such nice birds on their land, as it would only attract the hunters.

Of the Hungarian partridges, which were freed by the Horseshoe Lake Club at the same time six years ago, some were seen for two years, but never since. It is thought they took to the cultivated hills adjoining the low, marshy club grounds.—Otto Widmann, St. Louis, Mo.

MARYLAND NOW HAS HUNTING LICENSE LAW.

The Maryland legislature has passed a hunting license law, the revenue to be used for purchasing game and restocking depleted covers, and for employing wardens. Soon after the law went into effect last fall over 5,000 licenses were issued. The licenses are in the form of red tags, which are worn on the arm. In addition, legislation giving protection to song birds was passed.

NEW YORK STARTS CONSERVATION MAGAZINE.

The New York State Conservation Commission has begun the publication of a monthly magazine called "The Conservationist." The subscription price is 50 cents per year. In the initial number (January, 1917) the aims of the magazine are thus outlined:

"Practical problems of conservation are before the people of the state of New York today, which in their importance have never been transcended. Their solution will require careful thought and full discussion. The *Conservationist* will take them up from time to time, and its pages will constitute a forum where any citizen of the state, who has something to say that is worth while and in good faith, can present his point of view.

"Freed from the necessity that controls dry reports, the *Conservationist* will aim to be an index of the very life pulse of conservation throughout the state. It invites the cooperation of every conservationist to this end."

The February number contains many interesting articles and is well illustrated. Most of the periodical is devoted to short general articles, as for instance, "The uncontrolled cat," "Tarleton Hoffman Bean" and "The vanished woods." There is a lack of editorials, and but one page of short notes, with the heading "Field notes."

ADVISORY BOARD ON WILD LIFE PROTECTION IN CANADA.

The Canadian government, by an order in council dated December 28, 1916, has appointed an interdepartmental advisory board on life protection for the purpose of formulating plans regarding the protection and use of the wild life—by which term is meant the fur-bearing and big game mammals, the wild fowl and other animal life—of the northwestern territories, and of advising in the administration of the Northwest Game Act and of the legislation under the recently ratified international treaty for the protection of migratory birds in Canada and the United States, and generally, for the purpose of advising it on questions relating to the protection of and use of wild life in Canada. The advisory board is constituted as follows: James White, assistant to the chairman of the commission of conservation; D. C. Scott, deputy superintendent general of Indian affairs; Dr. C. G. Hewitt, Dominion entomologist; Dr. R. M. Anderson, geological survey; J. B. Harkin, commissioner of Dominion parks.

Mr. James White is chairman and Dr. Hewitt is secretary of the board; Mr. White and Dr. Hewitt are also representatives of the government on the permanent consultative commission for the international protection of nature.—*Science*, N. S. Vol. XLV, No. 1159.

FUR CROP A LARGE ONE.

The annual production of fur in Minnesota approximates in value $1,310,875. There are taken annually about 3,000,000 muskrats, 75,000 skunks, 20,000 wolves, besides other varieties of fur-bearing animals. Fur farming has been engaged in to some extent, one operator reporting sales to the amount of $12,000 worth of foxes; another $6,635 worth of skunk. The industry is increasing and offers inducements. — *Fins, Feathers and Fur*, Dec., 1916.

PERMANENT LECTURER IN MASSACHUSETTS.

If the recommendation of Mr. E. H. Forbush, State Ornithologist of Massachusetts, in his annual report for 1916, be adopted by the state legislature, Massachusetts will employ a permanent lecturer to address the schools throughout the state, in order to awaken an interest in birds among the pupils. This is the first proposal of its kind and its prospects of success seem to be favorable.—*Current Items of Interest*, April 8, 1917.

A NEW BIRD SANCTUARY IN BRITISH COLUMBIA.

Bare Island, in Haro Strait (which separates Vancouver Island from the mainland), is the breeding home of a large colony of gulls, guillemots, cormorants, and puffins, and harbors many geese during autumn and winter. It has recently been constituted a bird sanctuary and the Provincial Museum at Victoria, an active agent for bird protection, has been made its legal guardian.—*Current Items of Interest*, May 2, 1917.

BIRD-PROTECTION PLACARDS IN MILITARY CAMPS.

The bird-protection placards of the British Society for the Protection of Birds have been posted in military camps in Great Britain.—*Current Items of Interest*, May 2, 1917.

THE WEST VIRGINIA LICENSE LAW.

West Virginia allows residents to hunt in their own counties free of charge. A free license, however, must be obtained. To hunt in any other or all counties of the state a $3 license is required. Nonresidents are charged $16 for a license to hunt and $5 for a license to fish. Unnaturalized aliens are not allowed to hunt in the state or to carry firearms for such purposes. They are, however, allowed to fish after procuring a license costing $5. In West Virginia it is unlawful to hunt or fish on Sunday, to hunt or fish on enclosed or improved lands of another without written permission; to buy, sell, transport out of state, or serve at any restaurant or hotel any of the game fish, game animals or game birds of this state; to fish except with hook and line or troll line; to shoot or discharge firearms in or across any public road, or within four hundred feet of any schoolhouse or within six hundred feet of any occupied dwelling house; to wound carelessly or to kill any human being or live stock; to allow matter deleterious to fish to enter any stream of the state; to maintain any dam or other obstruction to the easy passage of fish up or down any stream without providing same with a fishway.

TEXAS NEEDS REFORMS.

Mr. H. P. Attwater, in a paper on "The Disappearance of Wild Life" (Bull. Scientific Society of San Antonio, Vol. 1, No. 3, pp. 58–59), points out the wanton destruction of wild life in Texas and suggests the following reforms:

1. A hunting license law.
2. A closed season on prairie chicken and antelope for a term of years.
3. A closed season for wild turkeys during February and March and no killing of turkeys on their roosts.
4. An open season on the mourning dove to correspond to the open season on quail.
5. Reduction of daily bag limits.
6. Control of the English sparrow.
7. The granting of scientific collectors permits.
8. A live, active association for the protection of wild life.

LIFE HISTORY NOTES

LAKE MERRITT—A REFUGE FOR WATERFOWL.

In the heart of the city of Oakland there is situated a state game refuge. On beautiful Lake Merritt, only five minutes walk from the City Hall, wild ducks congregate in great numbers each winter. The successive appearance of the different varieties is very apparent on the lake. The first wild ducks that reach us in the fall from the north are the sprig, or pintails, which arrive in California during the latter part of August, and by September 1 are here in tens of thou-

sands. The majority of these sprig probably come from the Klamath Reservation, near the border of Oregon and California.

The next migratory winter visitors arrive here a little before the middle of October from that portion of Alaska known as "The Flats." This area of about 300 square miles of marsh land lies

the big inland lakes on the borders o our northern tier of states.

The hunting season commences in Cali fornia October 15. For the first fev weeks the ducks can not be driven awa; by the hunters from their favorite feedin; grounds on the vast marshes between San Francisco and the capital of the state—

Fig. 46. Horseshoe crab taken in South San Francisco Bay. This Atlantic coast species was probably introduced into California along with oyster spat many years ago. Photograph by J. H. Mentz.

in the vicinity of Circle City and Rampart. As their feeding grounds become frozen, they leave and hunt lower and warmer latitudes for the winter. This second fall flight brings countless millions of pintail, widgeon, green-winged teal, shovelers, gadwall and mallard.

Later follows the flight from the Yukon Delta and the Saskatchewan country bringing other hordes of game birds. The canvasbacks, redheads, and bluebills are the last to arrive, and they come from

Sacramento. But they soon discover lovely Lake Merritt, and by November 1 it is fairly alive with them.

Lake Merritt is a body of water about a mile long and one-half mile wide. It lies in the heart of Oakland, and is surrounded by some of the most aristocratic homes of that city. At the head of the lake stands Oakland's famous Civic Auditorium, erected at a cost of over a million dollars and seating 13,000 people. Miniature yachts, power boats and countless

pleasure craft make the lake their home. About a quarter of a mile of water, however, is wired off by the city authorities, and in this inclosure the wild ducks find protection.

realizes that he and his fellows are safe in Oakland's bird reservation. A wide automobile drive surrounds the lake, and from early morn until nightfall hundreds of visitors throng the park, delighted with

Fig. 47. Lake Merritt, Oakland, California, a state game refuge. Photograph by W. W. Richards.

Fig. 48. Canvasbacks, bluehills, and coots at north end of Lake Merritt. Photograph by W. W. Richards.

In the lake waters are seen the canvasback, the bluebill and the pintail, together with their ever constant friends, the mudhens. On the lawns congregate great flocks of sprig and widgeon (see figs. 48 and 49.) The wild bird of today soon

this most strange and wonderful picture of civilization and nature in such close touch with each other.

The city authorities see that birds are fed daily, and that they are in no way molested.

Oakland is indeed proud to welcome and take care of her feathered guests from the far north, knowing that the following year they will return with their broods and winter in California's most beautiful city.—W. W. Richards.

A COMMON MALADY AMONG WATERFOWL.

Examination of the viscera of a sick swan secured near Butte Creek, Sutter County, California, showed that the crop of this bird was covered inside with large nodules or growths that had secreted a cheesy white matter that had gathered in the lower portion of the crop. This substance was probably mucous-like in its character before the specimen was placed in formaldehyde. These diseased areas were examined by Mr. Wetmore of the Bureau of Biological Survey and by Dr. Gallagher of the Bureau of Animal Industry and were found to be an infection of the fungus disease known as aspergillosis. Aspergillosis is a common malady among waterfowl, but is one that seldom kills large numbers of birds in a locality. The fungi that cause it are usually taken in when feeding among decayed vegetation. Usually aspergillosis shows most plainly in the air sacs connecting with the lungs that fill the body of the bird. Examination of these air sacs usually shows thickened membranes or yellowish or greenish areas in places where these membranes touch the body walls. Occasionally these growths are found in other parts of the body as in the case of the swan.

There is nothing that may be done for birds affected by the disease, as any that may be captured would be so far gone that treatment would be useless. As has been said above, however, the disease is of no great importance.—E. W. Nelson.

Fig. 49. Ducks feeding on lawns bordering Lake Merritt. Photograph by W. W. Richards.

HORSESHOE CRAB.

On the fourteenth day of May, this year, Tom Castagnolia, president of the "San Francisco Striped Bass Fisherman's Protective Association," brought into the office of the Fish and Game Commission a live horseshoe crab (*Limulus polyphemus*) which had been taken in South San Francisco Bay by Simone Bruscoe, a fisherman of Fisherman's Wharf. According to Mr. Bruscoe the crab was taken in comparatively shallow water in the neighborhood of Redwood City, San Mateo County, California. In picking up his net he found the crab entangled in the meshes and as he regarded it as a curiosity he brought it home with him. The accompanying picture, which was taken by Mr. J. H. Mentz, shows a very clear likeness of the animal.

In looking up the literature we find that in 1880 W. N. Lockington reported the presence of the King or Horseshoe crab (*Limulus polyphemus*) in San Francisco

Bay, where, he says, it must have been accidentally introduced with the oyster spat, which was regularly brought from the Atlantic coast. At that time the crab was of rare occurrence and as far as we can learn specimens have not been taken since, until the capture of this one, here illustrated. On the Atlantic coast, where in places the horseshoe crab abounds, they are seldom utilized as food. They are captured, however, in large quantities in pound nets and traps and ground up for use as a fertilizer.—N. B. SCOFIELD.

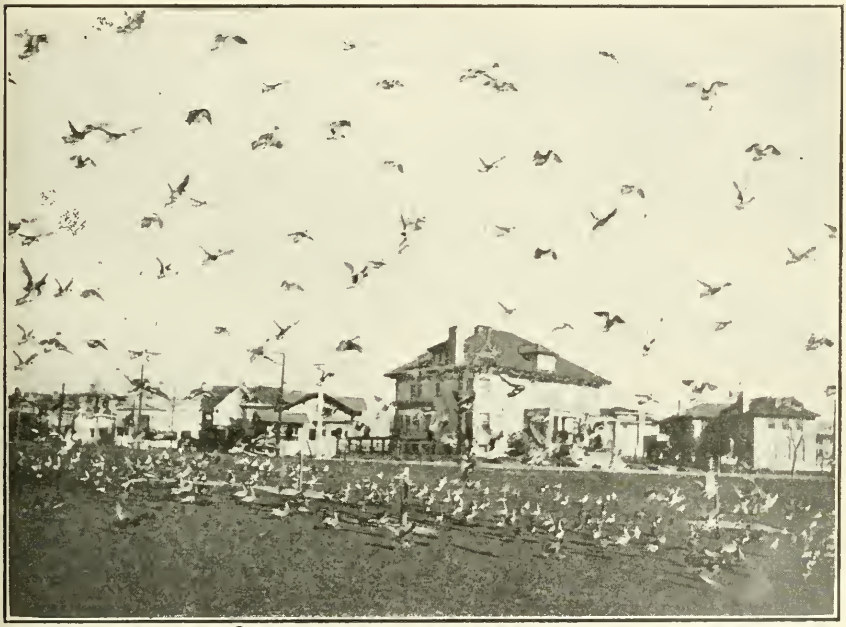

Fig. 50. Ducks as in figure 49 after being disturbed. Photograph by W. W. Richards.

BASKING SHARK TAKEN IN MONTEREY BAY.

On June 6, the Western Fish Company of San Francisco had on exhibition a shark captured in Monterey Bay by Santa Cruz fishermen. The shark was 18½ feet long and weighed nearly two tons. It was what is known as a basking shark and to ichthyologists as *Cetorhinus maximus*. As the shark has attracted a great deal of interest we quote the following from "Fishes" (pp. 196–197), by David Starr Jordan:

> "The largest of all living sharks is the basking shark * * * reaching a length of 36 feet and an enormous weight. It is a dull and sluggish animal of the northern seas, almost as inert as a sawlog, often floating slowly southward in pairs in the spring and caught occasionally by whalers for its liver. When caught, its huge flabby head spreads out wide on the ground, its weight in connection with the great size of the mouth-cavity rendering it shapeless. Although so clumsy and without spirit, it is said that a blow with its tail will crush an ordinary whaleboat. The basking shark is known on all northern coasts, but has most frequently been taken in the North Sea, and about Monterey Bay in California. From this locality specimens have been sent to the chief museums of Europe. In its external characters the basking shark has much in common with the man-eater. Its body is, however, relatively clumsy forward; its fins are lower, and its gill-openings are much broader, almost meeting under the throat. The great difference lies in the teeth, which in *Cetorhinus* are very small and weak, about 200 in each row. The basking shark, also called elephant shark and bone shark, does not pursue its prey, but feeds on small creatures to be taken without effort. Fossil teeth of *Cetorhinus* have been found from the Cretaceous, as also fossil gill-rakers, structures which in this shark are so long as to suggest whalebone."
>
> —N. B. SCOFIELD.

DUCKS AND GEESE PLENTIFUL IN PLUMAS COUNTY.

During March, 1917, there were more geese in the vicinity of Taylorsville, Plumas County, than the oldest inhabitant can remember having seen before. The geese feed on a species of sedge grass, the teal duck on a sort of water moss in the sloughs, the mallards and sprigs work out in the tules. I noted also 54 swans, all very tame. The swans do not appear to feed in daylight.—L. J. Warren.

DEER IN CALAVERAS COUNTY.

I've been through the Blue Mountain country (of Calaveras County) every winter for twelve years and I can say I never saw anything like the increase in the number of deer here. Every day we see them. The boys counted 29 in one herd and 32 in another, and besides we see numerous smaller herds. Yesterday I saw 20 without any effort on my part. This certainly speaks well for the enforcement of the game laws. Not over five years ago one had to tramp a considerable distance to find a deer, while a herd was quite a sight.—Joseph G. O'Brien.

THREE EASTERN BIRDS BECOMING ABUNDANT IN OREGON.

Mr. Stanley Jewett, of the United States Biological Survey, reports that several catbirds have been noted in eastern Oregon. The first record is for Baker County, August 11, 1906. Several of these birds have been seen in the eastern part of the state since that time. This year birds have been seen at five or six different places.

The bobwhite appeared in Harney County in 1908 and has increased rapidly since that time. The bobolink has been recorded in Grant and Baker counties.

THE SHEDDING OF ANTLERS.

Our blacktail buck shed his antlers on March 3, this year. The fact that this event occurred on January 25 last year, and the fact that one of our bucks on former occasions dropped his antlers on the same date (February 18) two consecutive years, does not appear to allow for any set rule in this matter.

The actual operation of shedding horns does not require the slightest effort on the part of the deer. In the above instance, I was scratching his head when something attracted him for a moment, and turning his head ever so slightly, one antler dropped.

Both antler and the place on the skull from which it dropped were smeared with blood. This formed into a scab and later disappeared.—Wm. N. Dirks.

A WINTER CATCH OF FURS.

My catch of furs between January 7 and January 30 in El Dorado County was as follows: 1 coyote, 1 striped skunk, 3 coons, 11 foxes, 11 bobcats, 30 skunks. In two weeks trapping near my home at Rescue I caught 20 skunks, 4 foxes, 3 bobcats, 3 house cats, 1 striped skunk and 1 coyote.—George Williamson, Jr.

UNITED STATES FOREST SERVICE COOPERATION.

MINK IN THE TRINITY NATIONAL FOREST.

Fifty-five to sixty mink were taken last year in the Trinity National Forest. Ranger Gray states that mink are found only along the watercourses, and they appear most numerous during the early spring months, usually during March and April. The food of these little animals consists almost entirely of fish. One trapper (Mr. J. N. McKnight) informs me that in digging out a den used by mink he uncovered twelve trout, ranging in lengths from six to ten inches each. The trout were covered with very moist earth, and from their appearance had been caught and stored by the mink within twelve hours. One mink only was taken from the den. Fewer mink are being taken from year to year and it is evident that close trapping is driving them to extinction.—E. V. Jotter.

LARGE CATCH OF FURS ON THE CALIFORNIA FOREST.

The catch of furs on the California National Forest for the past season on which we have definite information was as follows: 451 gray foxes, 261 skunks, 10 fishers, 121 bobcats, 3 mink, 30 coyotes,

49 coons, 36 ringtail cats, and 1 panther. In addition to this there was about $500 worth of fur shipped from the Covelo District and probably $200 worth from other parts of the Forest. From present indications there will be much more trapping done during the coming season. It is hoped that greater activity in this line will prove very beneficial to mountain quail and grouse, which seem to be steadily on the decrease, although comparatively few are killed by hunters. It is probable, however, that small hawks destroy more quail than any other single agency.

Owing to the season in Game District 2 opening a month later than in 1915 and the "no spike" law, deer were in better condition and were not so easy to kill. There were many more hunters, however, and it is estimated that in the neighborhood of 1,800 deer were killed during the season. This is about double the number which have been reported and is a conservative estimate, as it is hardly possible that anywhere near half of the deer killed are reported.—B. H. Mace.

TROUT PLANTED IN MONO COUNTY IN 1867.

Mr. Barney Peeler of Bridgeport, California, is authority for the statement that the Mono Lake Basin streams were stocked with trout from Virginia Creek in 1867, prior to which time these streams were barren. A mining company diverted the water at that time from Virginia Creek into Mill Creek and the trout (cutthroat) came into the latter stream. About this time trout were planted in Lee Vining and Rush creeks.—T. J. Janes.

MOUNTAIN QUAIL.

Mountain quail are getting very scarce in all parts of the Stanislaus National Forest, and at the rate they are disappearing, it will be a matter of a few years only until they are extinct. Very little hunting is done for this species alone, but quite a number are bagged during a season by hunters in pursuit of other game. Their nests are made on the ground, which would have something to do with their disappearance, since they naturally become a prey to snakes, and small predatory animals during the nesting period, mature birds as well as young and eggs being taken.

Mountain quail leave their winter haunts about April, traveling toward the higher altitudes, some stopping along the way to build their nests and rear their young, while others cross the summit and build their nests on the east side. The fall migration begins the latter part of August, and the birds return to altitudes of from two to three thousand feet about October, and here they winter. They feed on grass, seeds, berries and pine nuts.—Ernestt Bach.

BOY SCOUT COOPERATION.

WHY DEER ARE DECREASING.

Santa Maria, California, December 3, 1916.

California Fish and Game Commission:

Gentlemen: There are many reasons why our deer are gradually becoming fewer and fewer; one is that when deer season opens, men, sometimes accidentally and sometimes purposely, kill a doe instead of a buck. Some men go out expecting to be home within one or two days of when they started, and, with them, the limit of deer, which, in most cases, they fail to do, so, in such a case, they get greedy and shoot at any sort of a deer, no matter if it is a buck, doe, or a fawn. If they should happen to kill a doe, they would be afraid to take any part except the hind or fore quarters home with them. They might leave the carcass wherever it happened to fall. Some men, after the season has been closed, go out and kill deer just the same as they would if the season was open; when they do, this counts up on the destruction of the deer.

On the second page of *California Fish and Game* it states very clearly how greedy some hunters are. They get their venison unlawfully, and at the expense of the little fawns, who probably die of hunger, because some greedy hunter has killed their mother.

Very sincerely,

Fred Sword,

Patrol Leader of Crow Patrol, Santa Maria, Cal.

Scoutmaster, R. C. Wylie, No. 23202.

ADVOCATES DESTRUCTION OF ENGLISH SPARROW.

2716 Chester Ave., Bakersfield, California,
May 1, 1917.

State Fish and Game Commission:

DEAR SIR: The English sparrows now have begun to nest and it is now that the state of California should fight them. I have experimented with them by watching several nests closely and I find that this cannibal among other birds is very hardy. It can soon learn to fly after it has its wing feathers fairly started and it eats anything from fruit buds to bits of manure. It has only one good use that I can find and that is cleaning up the streets, which it does fairly well, but on the other hand it eats fruit buds and practically makes it impossible for an average person to raise vegetables, especially lettuce. The grown birds are very smart and watch the garden being planted —they are not afraid of scarecrows and as soon as the garden is planted they have what one might call a bird feast, by digging up there and everywhere, the small seeds. Their favorite nesting places are in cornices and nooks and corners, although if neither of these are available they will nest in trees. One house in the town of Taft burned down to the ground and its cause is supposed to be unknown. But I have noticed a bird nest under one eave. I went to see where the house was burnt the most and found it where I expected it, that was where the bird's nest was. The English sparrow, of course, never thinking of danger, for they have very poor thinking power, had probably seen a good match on the ground, and attracted by its color, thought it would make a good straw for its nest, and in placing it in and among the other bits of string, weeds, sticks, etc., it caught fire. Now that a new year has come the people ought to turn out to fight down the pest, for at the present time I could easily say without exaggerating that there are one billion or more sparrows in this state alone. Hoping this will help me have the honor of winning the pheasants, I remain, yours truly,

L. PAUL MARRIOTT.

BOY SCOUTS TO BECOME GAME WARDENS IN OREGON.

The State Game Warden expects to receive a great deal of assistance from Boy Scouts throughout Oregon. Briefly, the plan is to appoint from more than two thousand Boy Scouts not to exceed one hundred of their number to the position of Boy Scout Game Warden. Examinations will be held every Saturday for the next few months at the office of the State Game Warden for the purpose of determining the scout's knowledge of the game laws, outdoor conditions and methods of cooperation with the department. A number of these examinations have already been held and several scouts have been awarded the coveted badge of authority and commission, which is signed by Governor Withycombe and the State Game Warden.

The boys who have already been examined show a remarkable knowledge of the game laws and have answered almost perfectly more than one hundred and fifty questions propounded to them. While it is not believed that the Boy Scouts will be of any material assistance in rigidly enforcing the provisions of the law and in making arrests, nevertheless, the Game Department feels that the moral influence of the scouts on other boys will be great.

To illustrate, a few days ago a number of boys were shooting robins with slingshots in a certain locality. Robins are protected, and a Boy Scout happening upon the scene, immediately called the attention of the boys to the fact that robins were protected and asked them in a gentlemanly and boy-scoutly manner to stop this practice. The boys respected the scout and told him they would not do it any more.

The real value of such an influence cannot be overestimated. The boys of today are the sportsmen of tomorrow, and if they grow up with a thorough belief in the protection of our song birds and our animal life, they will be good sportsmen and good citizens.—*Oregon Sportsman*, April, 1917.

PHILADELPHIA BOY SCOUTS AS BIRD GUARDIANS.

A number of bird sanctuaries have been established on large estates around Philadelphia, each of which is under the care of a selected troop of Boy Scouts, who install resting and feeding boxes, post the place and take such measures as are practicable against cats, red squirrels, snakes and eggers. In the spring they plant shrubs suitable for nesting sites, food and shelter.—*Current Items of Interest*, April 8, 1917.

VIOLATIONS OF THE FISH AND GAME LAWS.

March 1 to May 31, 1917, Inclusive.

Offense	Number of arrests	Fines imposed
Game.		
Hunting without license	9	$140 00
Deer, close season, killing or possession	15	275 00
Female deer, killing or possession	4	200 00
Illegal deer hides	1	----------
Quail, close season, killing or possession	4	125 00
Ducks, close season, killing or possession	6	175 00
Doves, close season, killing or possession	2	25 00
Shore birds, close season, killing or possession	1	10 00
Cottontails, close season, killing or possession	3	60 00
Nongame birds, killing or possession	6	41 00
Total game violations	51	$1,051 00
Fish.		
Angling without a license	19	$290 00
Fishing for profit without license	22	225 00
Trout, close season, taking or possession	42	715 00
Trout, excess bag limit	10	123 00
Trout, taking other than with hook and line	5	215 00
Striped bass, underweight	2	100 00
Black bass, close season	2	----------
Halibut offering for sale, underweight	2	10 00
Salt water perch, offering for sale, close season	5	85 00
Catfish, offering for sale, undersize	6	80 00
Crabs, undersized or female, taking or possession	15	85 00
Clams, undersized, excess bag limit	16	230 00
Abalones, undersized, close season	14	280 00
Dried California shrimp in possession	4	80 00
Dynamiting fish	1	----------
Illegal nets	7	100 00
Total fish violations	172	$2,618 00
Grand total fish and game violations	223	$3,669 00

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

March 1 to May 31, 1917, Inclusive.

Game.		
Ducks	30	
Quail (4 live)	5	
Nongame birds	15	
Deer meat	260	pounds
Fish.		
Trout	799½	pounds
Striped bass	305½	pounds
Catfish	579	pounds
Halibut	2,693	pounds
Salt water perch	553½	pounds
Black bass	2	pounds
Crabs	283	
Abalones	208	
Clams	2,639	
Dried shrimp	2,292	pounds
Nets, traps and fishing outfits	15	
Searches.		
Illegal fish and game	11	

CALIFORNIA FISHERY PRODUCTS FOR JANUARY, FEBRUARY AND MARCH, 1917.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
Albacore											68,945					68,945
Anchovy							560		150,933		5,185		5,130			161,808
Barracuda										27,350	388,711		8,365		96,052	520,478
Bonito											1,368					1,368
Bocaccio							14,413	6,997	106,201							127,611
Bluefish									4,559							4,559
Chilipepper							44,940		18,747							63,687
Carp				3,598	24,925	22,519	2,170							7,960		61,202
Catfish		27,652		1,721	33,995	16,563										79,931
Coalfish							1,983	1,800			200					3,983
Cultus cod	63						97,400	42,528	51,320							191,311
Dogfish							1,680				3,987	83	6,098			11,848
Flounder	15,997		109			153	162,150				180	787	1,142			180,518
Halibut			17				6,915	6,239	1,509	132,686	483,708	4,215	34,716		726,999	1,397,004
Hake							23,665	32,300			7,968	615				64,548
Herring	5,745		2,481,440			126,555	721,834	33,280	5,228							3,374,082
Kingfish							1,939	4,188	331	1,050	274,835	1,380	8,255		60	292,038
Mackerel									11	55	87,726		9,388		8,560	105,740
Mullet											131			24,447		24,578
Pike				18	2,538	2,718										5,274
Pompano							159	698			1,342					2,199
Perch	5,733		19,759			64	28,713	2,864	14,352		28,819	3				100,307
Rock bass										500	48,338	6,792	2,834		120	58,584
Rockfish	1,884						202,552	78,006	290,126	75,640	1,051,564	9,083	337,435		4,530	2,050,820
Sole							1,911,767	402,947	15,384		6,865		95			2,337,058
Salmon			128	96,084	17,742	421,552	1,987	27,104	393,167					603		958,367
Smelt	19,056	570	6,950			39	28,407	372	4,067	20,025	31,829	32,682	13,513		160	157,670
Sea bass (white)							2,645	545	232		67,867	80	4,537		725	76,631
Sea bass (black)											60		2,077		3,085	5,222
Sandab							399,629	90,533	126		5,640	666				496,594
Striped bass		40	6,694	68,974	58,021	136,778	43,703		2,542							316,752

Shad			55	7,358	915	56,865	5,934	1,251			28					72,406
Sturgeon				533	1,847	1,141	85									3,606
Sardine			205				265	670	4,151,355		10,788,505		6,334,270			21,275,270
Skate							64,055				538					64,593
Sculpin											550		50			600
Sea trout																
Tom cod							19,003									19,003
Turbot			247													247
Whitebait			17				15,198									15,215
Yellowtail											54,319		350		35	54,704
Miscellaneous	297		2,636	2,859	15,599	5,106	14,222		900	170	57,486	2,045	2,353		1,640	105,313
Total fish	48,478	28,262	2,515,357	178,286	139,983	784,977	3,788,553	732,322	5,210,100	257,306	13,354,889	56,386	6,767,905	33,010	840,291	34,736,195
Crustaceans—																
Crab (dozen)	1,029						25,617	4,099½	19,038							49,783½
Spiny lobster										33,694	60,819	4,511	14,821		35,385	149,230
Shrimp							104,665									104,665
Crevisse																
Mollusks—																
Squid									21,556		54,362		80,191			156,109
Cuttlefish			14				2,009	5,275	1,429		45					8,772
Clam (Pismo)								3,825		68,169						71,994
Clam (cockle)		225	38,019								2,800					41,044
Clam (softshell)		4,878	32,023			23,200	1,312									61,413
Clam (mixed)	7,930	202	4,063				298			615	950	2,350				16,408
Oyster (shell), No.							302,530									302,530
Abalones		1,575						810	122,037	5,708						130,130
Mussels			384					2,140	4,420	1,158	26,192	1,500				35,794
California oysters			5,290													5,290
Bay mussels						4,050	7,253									11,303

STATEMENT OF EXPENDITURES FOR THE MONTHS OF JANUARY, FEBRUARY, MARCH AND APRIL, 1917.

	January	February	March	April
General Administration.				
General administration	$2,336 25	$1,753 97	$1,904 08	$1,844 93
Research, publicity and education	219 63	210 83	419 21	195 01
Printing	1,379 60	52 22	501 43	188 26
Fish exhibits	50 92			
Game exhibits	40 91			
Game farm	209 90	344 91	203 16	283 65
Mountain lion bounties	320 00	500 00	760 00	380 00
Lithographing hunting licenses				
Lithographing anglers' licenses				
Hunting license commissions and refunds	2,582 50	511 20	571 30	882 00
Anglers' license commissions and refunds	945 20	502 10	355 30	90 60
Market fishing license commissions and refunds	59 00	37 00	121 50	224 50
Totals	$8,143 91	$3,912 23	$4,835 98	$4,088 95
Patrol.				
San Francisco District	$4,818 63	$4,330 43	$4,862 73	$4,975 42
Sacramento District	3,241 39	3,277 99	3,497 48	3,593 75
Los Angeles District	1,752 96	1,961 69	2,063 43	2,445 00
Launch patrol	548 10	550 27	707 60	555 71
Prosecutions—fish and game	157 90	98 45	364 05	253 25
Crawfish inspection	100 00	100 00	132 26	273 33
Winter game feeding	12 20	1 70		23 04
Accident and death claims		541 11	124 04	124 04
Totals	$10,631 18	$10,861 64	$11,751 59	$12,243 54
Department of Fishculture.				
Hatchery administration	$728 22	$674 93	$762 48	$723 16
Mount Shasta hatchery	2,316 37	1,582 12	1,493 63	1,490 52
Mount Shasta auxiliary stations	20 00	408 67	400 20	461 00
Mount Whitney hatchery	467 13	543 67	347 38	577 69
Mount Whitney auxiliary stations				
Tahoe hatcheries	10 00	44 11	212 24	373 60
Tahoe hatcheries auxiliary stations				
Marlett-Carson hatchery	23 44			
Fort Seward hatchery	301 70	198 88	231 43	256 31
Ukiah hatchery		1 98		39 00
Snow Mountain station	70 27	295 78	311 61	450 22
Brookdale hatchery	107 95	151 74	165 33	146 94
Scotts Creek station	35 05	100 08	253 10	107 83
Almanor station	5 00	8 30	434 50	352 92
Bear Valley hatchery	15 15		375 27	288 10
Yuba City shad station				
Fish distribution	14 86	3 00	3 00	623 00
Fish transplanting				
Screen, fishway, water pollution	395 80	437 25	344 40	336 90
Totals	$4,510 94	$4,450 51	$5,334 57	$6,227 25
Commercial Fisheries Research.				
Fishery research and patrol	$311 25	$302 35	$377 75	$427 50
Grand totals	$23,597 28	$19,526 73	$22,299 89	$22,987 24

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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 3 SACRAMENTO, OCTOBER, 1917 Number 4

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THE SHARKS OF CALIFORNIA.

By EDWIN CHAPEN STARKS, Stanford University.

Now that the conservation of food is a matter of public interest it seems a propitious time to call attention to the great amount of possible food that we allow to go to waste in the sharks and skates. In Europe nearly all of the fishes of this group command as high a price in the market as do other coarse fishes. The writer has eaten several species of them in Italy and France, and though they can not compare with our fine-fleshed, delicately-flavored fishes, they do compare very well with many of our fishes and excel some of our coarser ones that we use in abundance.

We are just beginning to use and appreciate the grayfish, but most species, if not all, of this group are edible to judge by Mediterranean markets. Doubtless experimenting would show us that some of the sharks and skates are very good, and some, perhaps, so coarse and ill-flavored that we would not use them at all.

By causing a market demand for these fishes we should not only introduce a cheap fish food, but by reducing their number we should save many better fishes, as well as clams and oysters, of which sharks and skates eat great quantities, destroying thousands of dollars worth

of valuable food every year. They are counted as pests by the fishermen, for they not only take bait intended for marketable fishes, but they tangle and destroy the fishing gear.

Sharks and skates are the oldest and most widely distributed of the fishes. They have no bones, the skeleton being entirely of cartilage. They have no true scales, but are naked, or more usually covered with fine, sharp prickles, so that the skin resembles sandpaper. In fact, at one time sharkskin was used by cabinetmakers as they now use sandpaper. These fishes usually have five gill openings, though some forms have six or seven. Two of these exceptions we have on our coast. The tail fin is uneven, the "backbone" extending into the upper part of it, which is longer than the lower part, or it may extend in a whip-like organ in some skates. In the male a tube-like reproductive organ is developed on the hinder margin of each ventral fin. In all of our species the mouth is on the lower surface of the head with the snout extending over it. In some forms the eggs are hatched within the body and the young brought forth alive. In others the eggs are deposited on the sea bottom, where they remain uncared for until they hatch.

In the following account the sharks only are considered; the skates, which are closely related to them, being reserved for a future article. The characters here given will serve, it is hoped, to identify all of our

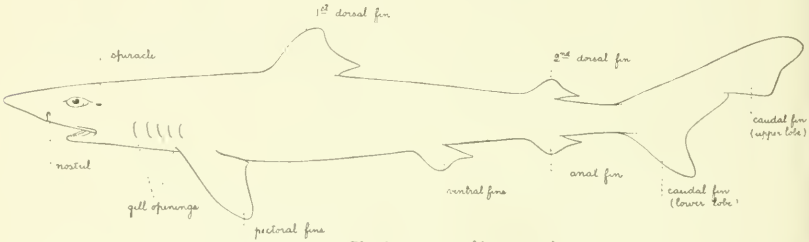


Fig 51 The Soupfin Shark (Galeus zyopterus)

sharks, but it will be necessary to learn the names of the fins and a few other things as given in figure 51.

1. The cow shark (*Notorhynchus maculatus*) may be known from all others on our coast by its seven gill slits. It is sandy gray in color and has small black spots scattered over it. This species and the next have only one dorsal fin. It is not very uncommon and is known along the entire coast from San Diego to Puget Sound.

2. The shovel-nosed shark (*Hexanchus griseus*) may be known from all others by its six gill slits. It is dark gray in color. It is widely distributed, being known from Scotland, the Mediterranean, the West Indies and northward on our coast to Puget Sound. It reaches a length of twenty-five feet. This shark must not be confused with the skate (guitar fish) known in southern California as the shovel-nosed shark.

3. The bullhead shark (*Heterodontus francisci*) is the only shark in our region that has a spine at the beginning of each dorsal fin and an anal fin in addition (see fig. 52). Another shark has dorsal spines but lacks an anal fin. This shark, as well as the shovel-nosed and cow shark, is interesting from the fact that its near relatives lived in early geologic

ages and it has changed but little from them. It is rather common on the southern California coast and does not grow to be over two or three feet in length. Above each eye is a high ridge, giving the animal

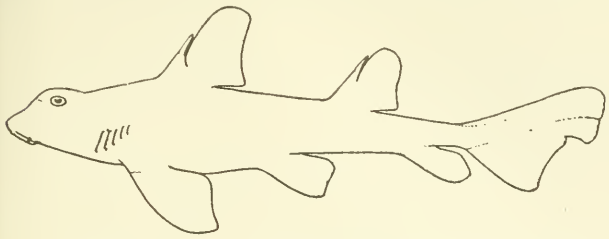


Fig 52 The Bullhead Shark (Heterodontus francisca)

a rather bizarre appearance. It is brown in color and has small black spots scattered over it. It feeds on crabs and clams which it crushes between its blunt molar-like teeth. The egg cases of this shark are often picked up on the beaches. They are conical, leather-like, and have a thin ledge arranged spirally around the outside, giving them a twisted appearance.

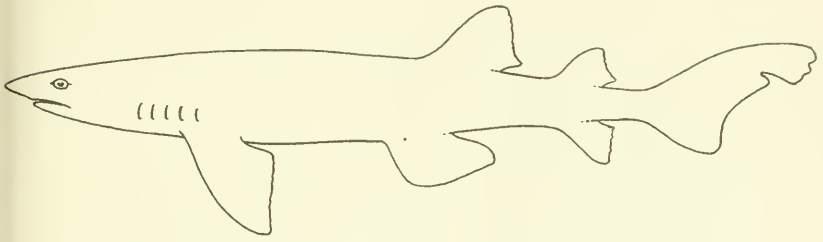


Fig 53 The Swell Shark (Catulus uter)

4. The swell shark (*Catulus uter*) may be known by its having an anal fin and in addition the first dorsal not in front of the ventrals (see fig. 53). Two other species of *Catulus* are found on our coast, but they are very rare and found in deep water, and are little apt to be seen, therefore they are not included here. They, too, have the above combination of characters, but the swell shark differs from them in having the distance from the tip of the snout to the edge of the upper lip just a little greater than the long diameter of the eye. It is grayish and tinged with yellow below, while dark crossbars are on the back. Blended dusky-brown spots are scattered over the body. The swell shark is about three feet in length at full size and is found from Monterey Bay southward to San Diego. It is abundant in the Santa Barbara Channel and is often taken in the lobster pots set for the spiny lobster. It gets its name from its habit of swelling itself up with air when it is taken from the water.

The following six genera all belong to one family: *Mustelus, Triakis, Galeus, Galeocerdo, Prionace,* and *Carcharinus.* We shall first give the characters that separate the family as a whole from our other sharks

and under each species the characters that will separate it from others of the family.

The first dorsal entirely in front of the ventrals; second dorsal opposite to the anal; no dorsal spines; the last gill opening above the base of the pectoral; eyes with an inner eyelid; an anal fin present; a notch below the tip of the upper caudal lobe; the head not mallet-shaped nor the tail as long as the rest of the body.

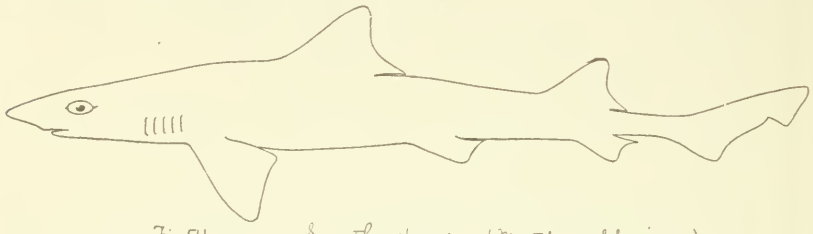


Fig 54 Smooth Hound (Mustelus californicus)

5. The smooth hound (*Mustelus californicus*) may be known by its small, blunt, pavement-like teeth arranged in oblique rows; even by the aid of a magnifier no point appears on the teeth as in the next species (see fig. 54). When the point of the pectoral fin is held close to the body it does not reach past the front fourth of the base of the dorsal. Neither it nor the next species has the lower lobe of the caudal projecting. This shark is as abundant on the southern coast as the gray-fish is on the northern. It is known northward to San Francisco. It is a uniform lead color, growing white below, and does not exceed three and one-half feet in length.

The apparent difference in the shape of the front part of the head between *Mustelus californicus* and *Mustelus henlei* shown in the drawings of these two species is brought about by the former having been made from a photograph, which shows perspective; while the latter is, as usual, drawn like an architect's plan, without perspective. There is little or no real difference in this respect between the two.

Fig 55 Henle's Shark (Mustelus henlei)

6. Henle's shark (*Mustelus henlei*) in general appearance is much like the last, having very fine teeth and the lower lobe of the caudal not projecting, but a magnifying glass shows that the teeth have points and that most of them in the upper jaw have a small basal point on each tooth (see fig. 55). It may be easily known from the last by the posi-

tion of the dorsal above the point of the pectoral. When the pectoral is held close to the body its point reaches to under the middle of the dorsal base. Little is known as to the range and abundance of this species as it has been passed over as the smooth hound. It is known from about San Francisco and southward.

7. The little leopard shark (*Triakis semifasciatus*) may be known from others of its family (see family characters above) by the definite black crossbars across the back and extending down to the middle of the side. On the lower part of the side are round black spots, one or more opposite the space between each two bars.

This shark is found south of San Francisco to San Diego. Southward it is very abundant, but not so abundant as the smooth hound. It does not exceed three or four feet in length.

8. The soup-fin shark (*Galeorhinus zyopterus*) (see fig. 51) may be known from others in its family (see family characters above) by the teeth on the side of the jaw being notched on the outer edge below the point and the lower part of the notch divided into from three to five points. This shark is abundant south of San Francisco, especially below Point Concepcion. It reaches a length of six feet and is of some value for the oil which its liver yields, but more particularly for its fins, from which the Chinese make a finely-flavored soup, the cartilaginous fin-rays dissolving into a nutritious gelatine. They consider the fins of no other American shark of such value for food. Most of the fins on the market are used by Chinese in the United States, but some are shipped to China.

Like most sharks, this species readily takes a hook baited with any sort of meat, but particularly with herring or other silvery fish. When hooked the big ones afford some sport, but tire easily. They are usually found in water from twenty-five to fifty feet deep, but are not uncommon in shallow water.

9. The tiger shark (*Galeocerdo tigrinus*). This shark may be known from the others of its family (see family characters above) by the presence of a pit at the base of the tail on the upper surface and in addition a pore (spiracle) just behind the eye. Two other species in this family have the pit and others have the pore, but no other has both. The teeth are alike in both jaws, large and triangular, notched on the outer margin and finely serrated (saw-toothed) on the edges. The color is brown with numerous dark spots scattered over it larger than the eye. The adults may be nearly plain. This shark is not rare in tropical seas and is reported by fishermen as occurring along the southern California coast. It is only known from this region to zoologists, however, by some jaws of a specimen captured near San Diego. It is said to reach a length of twenty-five or thirty feet, and next to the great white shark is the most dreaded by sailors, forming the basis of not a few of the forecastle "yarns."

10. The great blue shark (*Prionace glauca*). This shark differs from other members of its family (see family characters above) in having no pore behind the eye and in addition the first dorsal nearer to the ventrals than to the pectorals (see fig. 56). The color is a

light blue-gray, much lighter on lower parts. This species is abundant in tropical seas, not uncommon in British waters, and is occasionally taken about San Francisco. It reaches a length of fifteen or twenty feet and shares with many other sharks the reputation of being a man-eater.

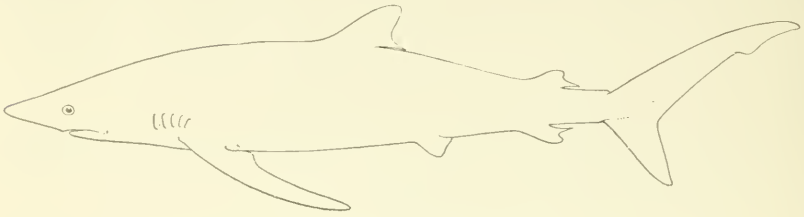


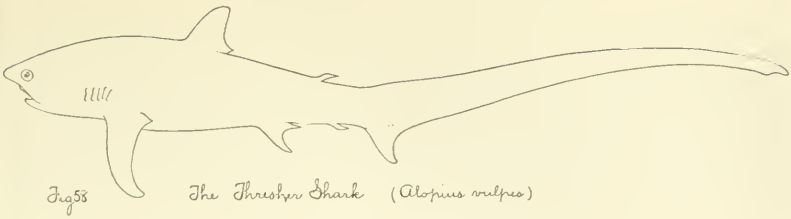
Fig 56 The Great Blue Shark (Prionace glauca)

11. The bay shark (*Carcharinus lamiella*). This shark and the last are the only ones of their family (see family characters above) without a pore (spiracle) behind the eye. It may be known from the great blue shark by the position of the first dorsal, which is nearer the pectorals than to the ventrals. Color plain gray, white below. This species is known from southern California to Mazatlan, Mexico. A specimen taken at Santa Catalina Island a few years ago measured twelve feet in length.

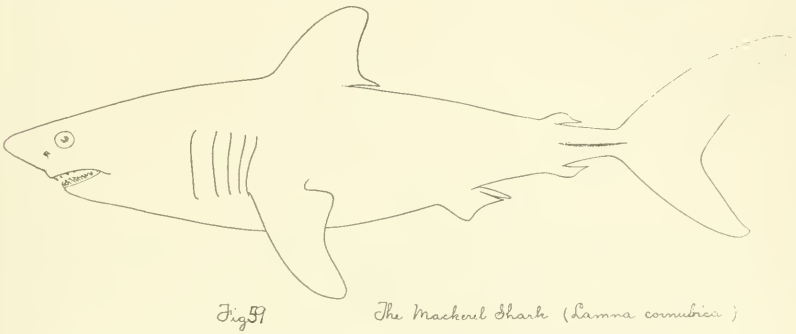
Fig 57
The Hammerhead Shark
(Sphyrna zygaena)

12. The hammer-head shark (*Sphyrna zygæna*). This shark is known at once from all others on our coast by the sides of the head being developed far outwards from the rest of the body, forming outstanding lobes on which the eyes are placed (see fig. 57). The color is plain slaty-gray. This remarkable shark is common in all warm seas and occasional specimens are taken on our southern California coast. It reaches a length of fifteen feet and has an evil reputation among sailors and fishermen. Its food consists largely of bottom-feeding fishes.

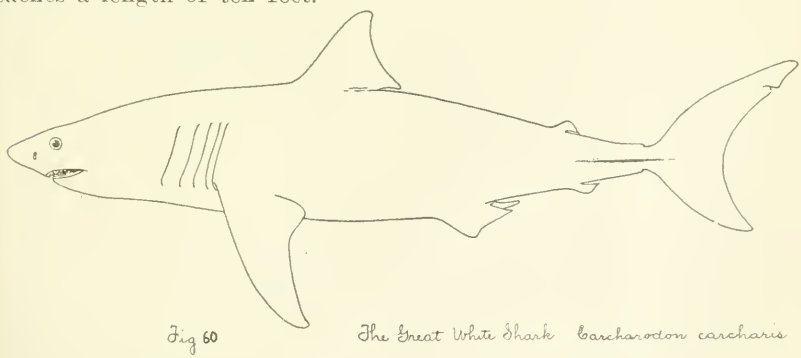
13. The thresher shark (*Alopias vulpes*). This shark may be known at once by the great length of its tail, which is about as long as the rest of the body (see fig. 58). The thresher shark is of wide dis-



tribution, being found in all warm seas and occasionally taken on the California coast north of San Francisco. It reaches a large size and the powerful strokes it gives with its tail renders its capture a rather difficult matter.



14. The mackerel shark (*Lamna cornubica*). The caudal fin evenly rounded behind, with only a slight notch below the upper lobe; an outstanding keel along each side of the tail; *the teeth sharp and their edges entire* (not saw-toothed) separates this shark from other west coast forms (see fig. 59). Color bluish-black above, growing abruptly white at middle of sides. The mackerel shark is widely distributed over the northern Atlantic and Pacific and is not rare on the California coast. It reaches a length of ten feet.



15. The great white shark (*Carcharodon carcharias*). The caudal fin evenly rounded behind and with only a slight notch below the point of the upper lobe; an outstanding keel along each side of the tail, all of which are as in the mackerel shark, but this shark has the teeth triangular and the edge of each broken up into saw-tooth-like points (see fig. 60). Color, leaden gray on back and sides, white below. This

shark is widely distributed in warm seas and reaches a large size. It is probably not common in our region. A few specimens taken in Monterey Bay have been recorded up to twenty-four feet in length. A specimen recently taken at Santa Monica is said to have measured thirty-two feet in length. Among sailors the great white shark, otherwise known as the man-eater shark, has the most evil reputation of any of the sharks.

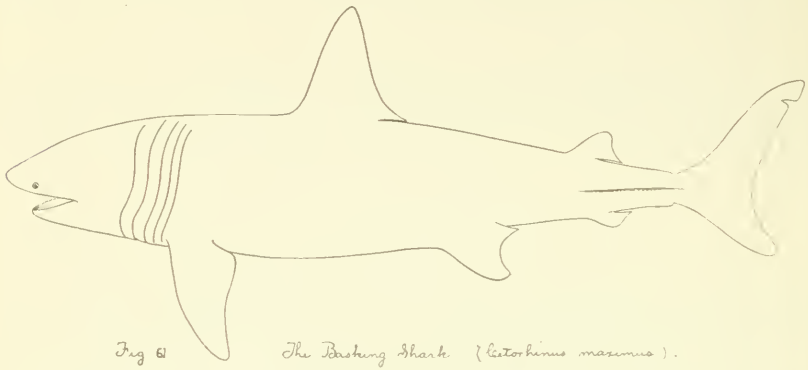


Fig 61 The Basking Shark (Cetorhinus maximus).

16. The basking shark (*Cetorhinus maximus*). The size of the gill slits, which nearly meet under the throat, at once identifies this great shark (see fig. 61). It has the caudal fin and caudal keels as in the last two. The basking shark is found in Arctic seas and is not infrequently taken as far south as Monterey Bay. Recently one was taken at Santa Monica. It is known to reach a length of thirty-six feet. Its habit of remaining motionless or drifting slowly along the surface of the water as if basking in the sun has given it its common name. It is said to be easily approached and harpooned when thus at the surface, but its final capture is difficult and dangerous on account of the powerful blows it may deliver with its tail. In Monterey Bay it has sometimes been caught in gill nets by swimming into them and then turning over and over, wrapping them tightly about its head, closing its gill slits, and so strangling. Its teeth are smaller than those of any other shark, there being about 200 in each row. This, together with its long, close-set gill rakers and sluggish habits, indicates that it probably feeds upon small organisms, rather than upon fish or other animals that would entail swiftness in their capture.

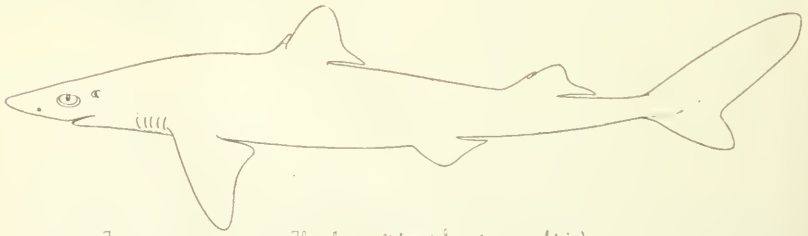


Fig 62 The Gray fish (Squalus suckleii)

17. The grayfish or dogfish (*Squalus suckleii*). The absence of an anal fin, together with the presence of a spine in front of each dorsal fin, at once serves to identify this shark (see fig. 62). Its color is

18. The angel shark or monk-fish (*Squatina californica*). This shark is flat and disk-like and is more easily confused with the skates than with the sharks, but it may be known by the gill openings being slaty-gray, shading to white on lower parts. White spots are often scattered over the body, especially in the young. The grayfish is extremely abundant along our coast and northward to Alaska. South of Point Concepcion it is only found in deep water, and is probably not very common, but northward it occurs in shallow bays in great numbers. It does not exceed a length of three or four feet.

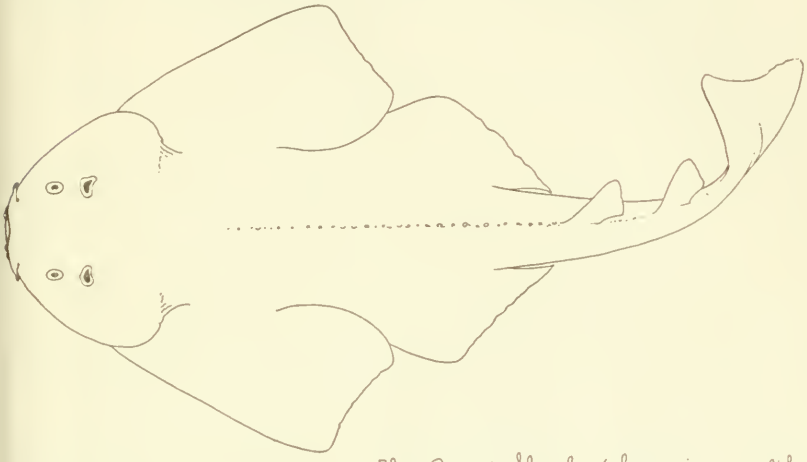


Fig 63 The Angel Shark (Squatina californica)

crowded together in a deep notch behind the head (see fig. 63). It is found in all warm seas and on our coast it is not rare south of San Francisco.

TEMPERATURE AND THE ALBACORE.

By Will F. Thompson.

The research on the albacore now proceeding under the direction of the California Fish and Game Commission has been under way but a short time, yet certain facts as to the correlation of the temperature with the catch seem important enough to call for remark. Rarely, in so far as the writer knows, has there been found a case in which the correlation is as evident and clearly cut. Further investigations are in progress, and it is hoped that in the final report it will be possible to indicate various interesting applications of the observations made here. The fact of the correlation can not well be doubted, but there remains the question as to whether it is not in part due to certain factors allied with temperature.

The albacore fishery, at first glimpse, is one dependent to a great degree on the activity of the fish, the acuteness of its vision, and its hunger. The boats used are large, seagoing, and motor driven, carrying three to five men. They leave port at about midnight, catching the live

bait of sardines and anchovies (or other species) with a seine before daybreak. This they place in the stern of the boat in a pyramidal box through which fresh sea water is continually pumped to keep the bait alive, for it is thought that the albacore prefers live bait to all other. Then lines with bone or rag lures, called "jigs," are dropped a hundred feet astern, more or less, and towed at full speed barely below the surface of the water until an albacore "strikes" them. Sometimes, on the best days, the fish, shining like silver in the bright sun, leap clear into the air as they strike the "jig." Then in great haste, lest the fish pass on, the live bait is thrown out in dip netfuls while the boat is stopped and brought about. The live bait attracts the school of albacore to the boat, and the throwing out of the bait is called "chumming" them. Then hooks on hand pole and lines are baited with sardines, or anchovies, and dropped overboard. The fish in the school may be seen swimming swiftly to and fro in the clear water under the boat, their long pectoral fins extended. While they remain they take the baited hooks with great rapidity; then, perhaps after a ton or but fifty pounds has been caught, the school vanishes as quickly as it came, and trolling with the "jigs" is resumed. The fish are first caught directly on the surface by the "jig," and although the fishermen speak of them as "coming up," an unprejudiced observer must hesitate long before he concludes that they abide at any considerable depth, at least during the height of the summer. Nowhere in the world is there a fishery so beautifully adapted as an index to the habits of the fish concerned, for its activity and its hunger are vital factors in the success of the catch.

Considering recent work on the effect of temperature on activity and digestion, it was entirely natural to turn to a comparison of temperature fluctuations with those of the catch, particularly as the fluctuations of the catch are such a prominent feature of the fishery. For such a comparison, the ideal data would be the temperatures of the surface water where the fish were caught, but when the variations which exist between near-by areas of water, the diurnal changes, the weekly and monthly fluctuations are considered, the number of observations necessary becomes excessive. There is a probable index to the varying temperatures of the water in the admirable records kept by the Weather Bureau of the United States, to whose various officials the writer is deeply obliged for their assistance. The minimum temperature reached during the night at such places as San Diego, Avalon, and Santa Barbara, must be greatly influenced by the warmth or coolness of the near-by bodies of water, if indeed the air and water temperatures are not resultant in good part from the same meteorological conditions. Data as to this will be presented in the final report. It has been assumed in this paper that the temperature of the air affords a good criterion of the fluctuations in that of the water.

There are of course many things about the catch which must be guarded against in accepting it as representative of the "abundance" of fish, as that term is usually understood among the fishermen. Chief among these is the fact of the derivation of the catch from different

localities at various seasons. Without going into details, it has been thought best to utilize the catch of the San Diego boats during their whole season as being derived from a region whose temperature is indicated by the San Diego records. Those of the more northern canneries in Los Angeles County take their catches almost altogether in the more northern districts during the latter part of the season, especially after the San Diego season has closed, and therefore emphasis is laid on that part of the record as being more apt to reflect the true condition of affairs. Important, also, is the varying ability of the fishermen, and what may be called the "catching capacity" of each boat. To eliminate this source of error, it has been necessary to treat each catch of each boat as a per cent of its capacity for taking fish as compared with other boats. The method will be detailed in the final report. The labor of such treatment was great, but the result gives an approximate idea of the fluctuation in "abundance" of the fish even when relatively few boats are considered. Other minor causes of variation could not be guarded against, and are undoubtedly the sources of certain discrepancies. In the accompanying charts the rise and fall of the catch as the season of 1916 progressed is shown by broken lines, and that of the temperature by the unbroken lines.

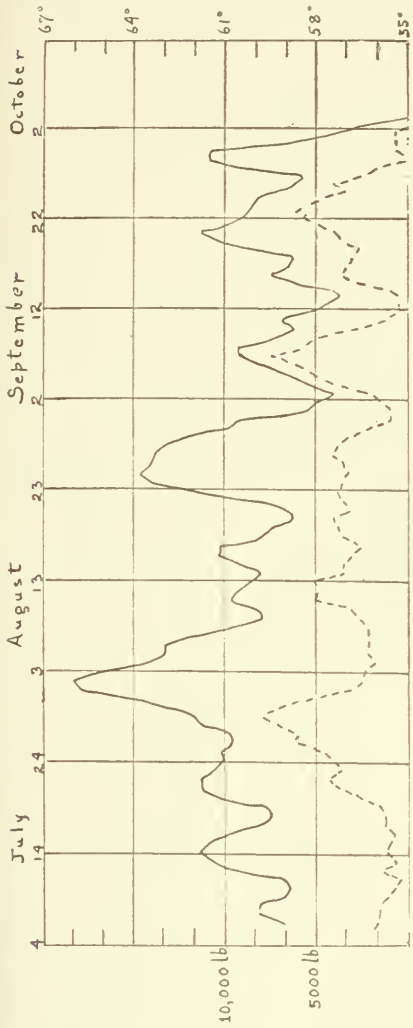


Fig. 64. Comparison of catch and temperature in the region of San Diego. Unbroken line —mean minimum temperature. Broken line —catch per boat.

In figure 64 the relationship between the given curves needs no explanation, but in considering figure 65 certain things must be borne in mind. The first part of the catch is compared with the temperature curve at Avalon, as more representative of the locality in which the catch was taken, but as a matter of fact it probably came from too many regions to be strictly comparable to the temperature of any one locality. The general course of the curves is the same, however. For comparison with the latter end of the season, the temperature at Santa Barbara is taken, because of the tendency to fish in northern waters at that time, although there was not, in 1916, the usual run at Santa Cruz Island. In

order to render more lucid the agreement between the temperature and catch in September both Avalon and Santa Barbara curves are utilized for that period. The essential agreement between the minor high and low points of the three lines in that month may be easily seen in addition to the fact that both temperature and catch were steadily falling. Nevertheless, the agreement in figure 65 must be considered as being necessarily less complete than that in figure 64, because of the greater diversity in the origin of the catch.

The correlation is, however, remarkable, and can not be regarded as showing less than an intimate relationship. Most significant, perhaps, is the fact that a rise and fall in the temperature within the comparatively brief time of ten days is echoed by that of the catch. There can not be any doubt whatever that the catch fluctuates with the temperature

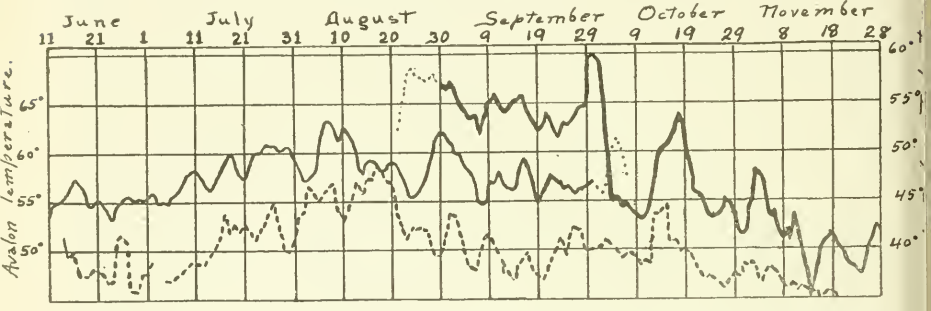


Fig. 65. Comparison of average catch of boats from Los Angeles County, with mean minimum temperatures at Avalon and Santa Barbara (city). Unbroken line to left—Avalon temperatures. Unbroken line to right—Santa Barbara temperatures. Broken line (lower) —average catch per boat.

itself, or with certain things connected with its rise and fall. The step to an explanation of the disappearance of the species during the winter is easily made, for it is hard to see wherein a brief period of low temperatures varies from winter conditions, save in duration and intensity. It would appear logical, then, to ascribe the disappearance of the fish to climatic conditions, rather than migration.

There remains, awaiting explanation, the fact that fish are caught in certain areas at times when none are caught in others. This does not mean total absence, but simply such a difference in abundance as to attract the fishermen away from one region into another. It is well known that the last of the season of fishing is spent in more northern waters, such as those around Santa Cruz and Anacapa islands. Not so well known is the corresponding fact that, in 1916 for instance, September was warmer than August near Avalon and Santa Barbara, and that the reverse was true at San Diego. The summer season came later—lagged in other words—in these more northern districts, a fact which is true of the normal temperatures as given in the United States Weather Bureau Reports for those localities. The lag was still more pronounced in 1916 at San Luis Obispo, farther north than Santa Barbara.

In observing the catch for 1917, some good examples of the varying catch in accordance with the temperature have been found. Although the total catch for the year has not as yet been compared with the temperature, it may be permissible to give portions which are approxi-

mately correct. During the first days of August, until the fourth, inclusive, the notes kept by the writer record the fact that there was a "run" of fish at Anacapa and Santa Cruz islands. This ceased about the fifth and the fishing fleet moved to the southward, catching fish nearer Santa Catalina Island, until by the eighth almost all the catch came from the vicinity of Catalina. These facts were obtained through personal interviews with the fishermen when the fish were unloaded at the canneries, and do not mean that all the fish were taken in the said localities, but that the majority of those taken by the fleet from the northern canneries were. In the accompanying plate (figure 66) the curve for the mean minimum temperature at Avalon (Santa Catalina Island) is given by means of a dotted line, that of Santa Barbara (for the vicinity of Santa Cruz and Anacapa islands) by means of a line of dashes, while the catch is represented by an unbroken line. The temperatures are those given on the daily weather charts for Santa Barbara, and will undoubtedly be subject to certain corrections, but are nearly enough correct to be truthful. The curves are smoothed by averaging in threes, an operation not affecting the variations under consideration. It will be noticed that when the catch of fish came from Santa Cruz waters the Santa Barbara mean temperature was high, but when the catch came from the southward, the same temperature fell decidedly below that recorded at Avalon. The coincidence is too plain to be illusory.

Another similar case is to be seen in the "run" of fish from Santa Cruz waters in the last of August. In considering the plotted curves given in explanation of this (figure 66), it must be borne in mind that the minimum temperature of the air does not indicate absolutely the temperature of the water, but simply probably its fluctuations. It should not be expected that the curves of Avalon and Santa Barbara temperatures be coincident, for the mean minimum temperature at Santa Barbara is normally less than that at Avalon, so that when the two do coincide, that at Santa Barbara must be considered proportionately higher than at Avalon. After August 6, and up to August 22, the receipts from Santa Cruz waters were small, forming but a small portion only of the total, but the rise in catch subsequent to that was due almost in its entirety to an influx of fish from Santa Cruz. A certain amount came from San Diego just previous to the twenty-second, but this will not enter into the consideration of the locality of the catch in northern waters. By comparing the temperature records it will be seen that the first falling off in the catch after the thirteenth resulted from or accompanied a falling temperature at Avalon, which continued low throughout the month. The increase in the catch at Santa Cruz accompanied a rise in temperature there (at Santa Barbara) and not at Avalon. In conjunction with the condition remarked on in the foregoing paragraph, it will be seen that this indicates that where the temperature at Santa Barbara (for the Santa Cruz region) approaches or exceeds that at Avalon the catch comes from Santa Cruz waters. This is not true of the earlier part of the season.

The consequences of such an obvious correlation are far reaching. Certainly the hypothesis of migration can not longer depend on the shifting origin of the catch for support, although just as truly it is still probable that a migration does occur. Until some basis for supposing it to take place is brought forward, however, it should not be utilized to explain the distribution of the species, or its absence during the winter months. There is as yet no distinction to be seen between a temporary disappearance during the summer season and that during the winter. The causes as far as we know them, which operate to

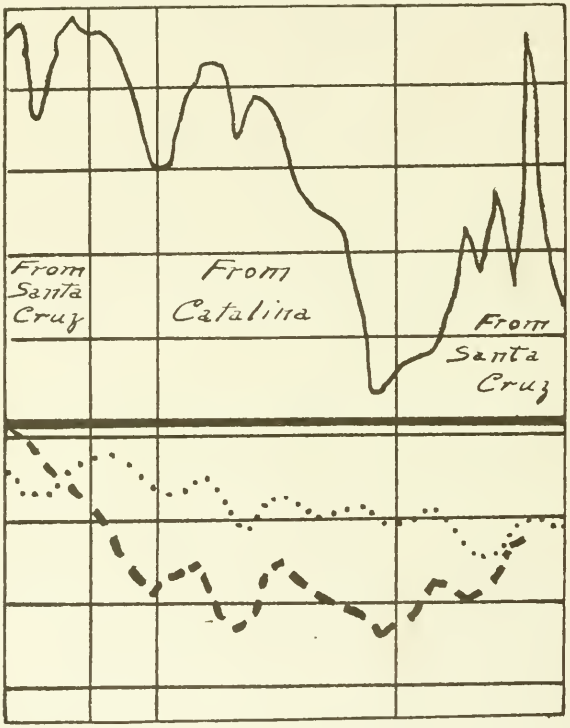


Fig. 66. Comparison of total catch of boats, with mean minimum temperatures at Santa Barbara (line of dashes) and Avalon (dotted line), showing derivation of main catch from Santa Cruz region when temperature at Santa Barbara increases relatively to that at Avalon. (Data as to catch from Canner's Clearing House.)

banish the fish from our ken, are precisely the same in both cases, except that those of winter are more extensive and correspondingly more effective.

It is possible to explain the disappearance and appearance of the albacore, by ascribing to it movements in pursuit of food. It must be shown, however, that the movements of its food (largely other fishes) are just as closely correlated with the climatic conditions as are those of the albacore. Moreover, it may be easily shown that food is not

absent from our waters during the winter months, as witness the beginning of the sardine canning season after the closure of that of the albacore. It would be unwise to in any way deny the possibility of such an indirect connection between the albacore and the climatic conditions, but there are certainly many obvious difficulties still left for solution before such can be established.

Although there is also much to be done before the direct influence of temperature on the albacore can be shown, it is possible to find many facts tending to render the existence of such very probable. The effect of temperature on the activity of cold-blooded animals has long been recognized. The lessened rate of digestion and of metabolism in the reptiles and amphibians results in the obvious and striking torpidity, the greatly lessened demand for food and for oxygen during periods of cold. The pronounced effect of lowered temperatures on digestion and physiological activities has been repeatedly shown in the laboratory. Not quite as well known, perhaps, as the effect of cold on land animals, is its effect on fishes, but gradually accumulating evidence points unmistakably in that direction. The lessened catch in line fisheries in the winter months, the fact that certain fresh water fishes lie torpid in the sand or mud during cold periods, and the now well-known and remarkable evidences of decreased rates of growth during the winter left on the scales of fishes, all indicate that the effect of temperature on cold-blooded animals is just as pronounced and universal in the water as it is on the land. If the effect is resultant from the direct influence of temperature on chemical reactions, and if an accurate and sensitive register of the activity of an animal is at hand, the variations should be as closely correlated with fluctuations in temperature as are those of a chemical reaction, or of a physiological experiment in the laboratory. As has been previously noticed, the albacore fishery is one remarkable for its dependence on the hunger and activity of the fish, and involves the presence of the albacore in the superficial strata of water—if not continuously, at least temporarily. A very slightly diminished activity would undoubtedly be mirrored in the catch.

It should not be forgotten that, because of the multiplicity of factors entering into the life of a species of fish, the probabilities are great that the catch is not an absolutely accurate and sensitive register of the direct action of the temperature, if such is present. Nor is it improbable that the catch is dependent on things which may on their part be correlated with temperature changes. Hence, although it is not to be denied that the discovery of a correlation between catch and temperature is a step toward a solution, the placing of undue emphasis on temperature fluctuations as indicative of the success or failure of the commercial fishery is earnestly deprecated.

The present paper is intended above all as an indication of what might be discovered if adequate facts and statistics were at hand. It is to be hoped that endeavors to obtain such data will meet with the earnest cooperation of those most interested, the canners and fishermen; for without such, progress will be greatly hindered.

MOUNTAIN LION HUNTING IN CALIFORNIA.

By Harold C. Bryant.

It is a well-established fact that the mountain lion or cougar is the most important enemy of deer. Those who have studied the problem believe that a single mountain lion kills an average of one deer a week throughout the year, thus making a total of at least fifty victims annually. A lion often kills more than it is able to eat. There are records of one lion having killed three deer in a single night, and large deer appear to fall prey about as often as small ones. W. T. Shock followed a male lion for three days in Trinity County and found that it had killed three bucks during that time. It is evident that a lion kills many more deer in a year than many hunters do in a lifetime. This being the case, one of the dependable methods of conserving deer would naturally be the destruction of this enemy. This is exactly what is being done. The California Fish and Game Commission has offered a bounty of $20 for the past ten years as an incentive to destroy the mountain lion, so that deer may become more abundant. During this time bounties have been paid on more than 2,500 mountain lions. The amount so expended, totaling about $50,000, has been considered a wise investment by all those conversant with the subject because of the consequent saving of deer. The bounty on female lions was raised July 1, 1917, to $30. Some of the cattlemen offer additional bounty as a method of reducing the destruction of stock by the lion.

Statistics appear to indicate that mountain lions are slowly becoming reduced in numbers, for in 1908 bounties were paid on 482 lions, in 1912 on 275, in 1915 on 162, and in 1916 on 179. The abundance of mountain lions in different parts of the state is indicated to some extent also by the bounties paid. Thus we find Humboldt County leading with a kill of 493 from the time the bounty was established in 1907 up to 1916; Trinity comes next with 231, Siskiyou 229, Shasta 191, Mendocino 164, and Tehama 146. All other counties show a total of less than 100 lions for the same period. Santa Barbara County has claimed a bounty on 66, which places it in the lead of other counties of southern California. It also would appear from these figures that mountain lions have been more abundant in the northern Coast Range than in the Sierras. The accompanying table (page 165) shows the bounties paid during the years 1915 and 1916.

Although a bounty has been claimed on a total of 2,526 lions up to January 1, 1917, these animals are still abundant in most of the counties named above. Nor, notwithstanding the apparent decrease in numbers, is the mountain lion yet under control, and it continues its depredations, not only on deer, but on domestic stock. D. S. Brock states, "I have known of instances of a single lion killing three large-sized hogs, averaging in weight over two hundred pounds apiece, in a single night; also of one lion killing two large deer in one night. They will occasionally kill a deer, a hog and a calf, and eat only one meal from the lot, not even returning to eat more."

How can these depredations be still further reduced? The answer is: By taking a still larger toll of lions each year. We have two means

of bringing this about. We must either interest a larger number of persons in the problem, or we must encourage those who now hunt mountain lions to greater activity by offering a larger bounty. Both methods will probably have to be used. The following information on the methods of capturing lions has been compiled for the information and guidance of all those desiring to cooperate in the control of this deer slayer. The facts given should interest many mountaineers and sportsmen in a practical method of increasing big game.

Fig. 67. A trapped mountain lion. Photograph by O. F. Bacon.

The destruction of a mountain lion is not an easy task and the amateur is usually quickly outwitted by the animal. Lions are usually killed by mountaineers who know well the habits of the beasts. (This is readily proved by an examination of the claimants for the bounties.) But even though experience is a great aid, there is no reason why the amateur, if he be properly equipped, can not succeed.

A kill made by a lion is more often seen than the lion itself. Tracks and animals killed furnish the best clews to the hunter. The tracking of animals indicates that male lions cover a considerable distance when hunting. One in Trinity County when followed was found to have covered a distance of about twenty miles in three days. The same beat is often used for a long time. As a rule, the animals killed for food are only partly eaten. A male lion seldom covers his kill. The female, on the other hand, especially when hunting for her kittens, covers the kill with earth, leaves and rubbish. As a rule she hunts within a radius of five miles when her kittens are small, making a kill and then leading her kittens to it. The female is accompanied by her young for a considerable length of time; young of two sizes have often been seen with the mother. Carrion is rarely eaten, freshly killed meat being preferred.

We are indebted to several successful lion hunters for the following basic information on the usual methods pursued in hunting mountain lions in this state. This was kindly furnished in reply to a letter of inquiry.

SHOOTING.

Lions are largely nocturnal and so are seldom met with. The few which are shot by the hunter are secured by chance. Successful lion hunting is carried on by trapping or by tracking with dogs.

TRAPPING.

Mr. O. F. Bacon, Cook, California, has been successful in the use of traps. The traps, three in number, are set about eighteen inches from the bait, which is placed in such a position that the traps must be crossed in order to obtain it. Each trap is set level with the surface of the ground and covered first with a piece of cloth and then concealed

with dirt. The chain from each trap is fastened to a near-by log, capable of being dragged by the lion. The entrails of a hog or calf, either fresh or fetid, make good bait. Mr. Bacon states that he has trapped eleven lions in this way. The best success has been obtained during the winter when food is hard to obtain.

Fig. 68. A treed mountain lion in Oregon. Photograph from Salisbury Wild Life Films. (Courtesy E. A. Salisbury.)

TRACKING WITH DOGS.

The method most universally followed is that of tracking a lion by means of trained dogs. The dogs used are commonly known as "varmint" dogs. They are usually mongrels, although fox-hounds are said to be especially valuable.

The type of dog needed is thus described by Mr. D. S. Brock: "Hounds that will trail on an old, cold trail, as well as on a fresh trail, and that will trail through and by bunches of deer, paying no attention to the deer whatever, are necessary for trailing lions. Then you know there is a lion when the dog trails, whether there is a visible trail or not. You want the kind of dogs that will trail ten miles if necessary without quitting."

This method is largely used during the winter season when the tracks are easily found and followed on the snow. "I always hunt for lions in a section where deer are plentiful and then search every bluff and

every pile of rocks. In this way I am sure to cross the trail of any lion either entering or leaving its lair. As a lion is usually after prey when moving, the hunter may find a kill at any point on his trail and strike a fresh trail because the lion has returned for a meal, or he may find the lion in near-by brush or rocks." [JAY C. BRUCE.]

As soon as a fresh enough trail has been found the dogs are put on the scent and are followed by the hunter. If a fresher trail is found this is followed until the lion is treed, after which he is quickly dispatched by means of a rifle. The hunter should approach the treed lion carefully so as to avoid the danger of the lion's escape and the necessity of again treeing the animal.

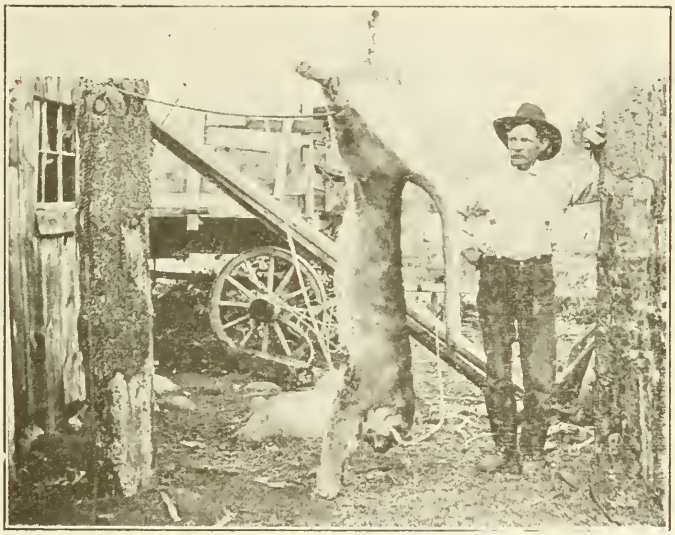


Fig. 69. Mountain lion killed October 15, 1915, at Heenan Lake, Alpine County, by Martin Nomont.

A typical experience in lion hunting as given by H. C. Chester is as follows: "About ten days ago a lion track was reported to me. I took four of my dogs, three start dogs and one younger one. The trail was four days old the morning my dogs picked it up. The dogs cold-trailed it for three and one-half days. The lion advanced about fifteen miles, but back-tracked and made many circles in making that distance. Each night I called the dogs off and took a new start in the morning. The fourth day at 12 o'clock they took a hot track from where the lion had been feeding on a deer carcass, and by one o'clock they had him treed. During the seven and one-half days the lion had killed four deer that I know of, one small deer, one large doe and two very large bucks. One buck the lion killed for pleasure and left lying on the ground untouched. The other three were only partly eaten."

In presenting claims for bounty several years ago, W. R. MacArthur of Beegum, Tehama County, wrote: "These five lions represent a month's hunting and a scope of perhaps thirty-five or forty miles of the roughest country in northern California. I have some fine dogs. We

got every lion of which we found the sign with the single exception of the mother of the kittens, and I hope to get her yet. We hunted the largest of these lions, the male, fifteen days. His track was always too old for the dogs, but we finally struck it one morning fresh, and got him in an hour. In our hunt after this lion we found twelve deer that he had killed—some he had only taken one small feed out of and never returned to them. I know this to be a fact, as we went morning after morning, hoping to strike his track at the carcasses, but a male lion never comes back if he can get a fresh deer when he is hungry. Where

Fig. 70. Mountain lion kittens. From Salisbury Wild Life Films. (Courtesy E. A. Salisbury.)

they have all they want, they take one feed in twenty-four hours, and a large lion will eat a deer in two or three days. On the other hand, a female lion with kittens, of which they have from two to four, hunts for the kittens until they are over a year old, killing a deer and taking a feed out of it and allowing the kits to stay and finish it up, while she gets another. A female lion with two or three kits will eat a large deer in twenty-four hours. It is an easy matter to get the kits if one can find where they have a deer."

"While hunting lions is often strenuous work, which subjects the hunter to severe exposure in rain and snow, the chase is always interesting and exciting, and, in my opinion, much better sport than hunting either deer or bear." [Jay C. Bruce.]

LION BOUNTIES.

Statement of lion bounties paid by the Fish and Game Commission, 1915 and 1916:

County	1915	1916	Total (Nov., 1907, to Jan., 1917)
Alameda			1
Alpine	1		1
Amador		1	9
Butte			30
Calaveras	3		11
Colusa	1		14
Del Norte	2	9	86
El Dorado		2	38
Fresno	1	1	11
Glenn			36
Humboldt	26	39	505
Imperial	1		1
Inyo	3	1	6
Kern	15	18	92
Lake	8	2	81
Lassen			6
Los Angeles	5	1	25
Madera	10	1	31
Mariposa	2	14	47
Mendocino	7	7	161
Merced			1
Modoc			3
Monterey	8	6	62
Mono		5	7
Napa			3
Nevada		2	5
Orange			4
Placer	1	4	30
Plumas			8
Riverside		3	16
San Benito	2	5	29
San Bernardino	1		14
San Diego	1	1	29
San Joaquin	2		2
San Luis Obispo	10	3	58
San Mateo			1
Santa Barbara	4	6	71
Santa Clara	1	4	12
Santa Cruz			1
Shasta	7	10	194
Sierra			6
Siskiyou	9	9	233
Sonoma		1	15
Stanislaus	1		4
Sutter			1
Tehama	4	1	147
Trinity	4	3	232
Tulare	8	8	63
Tuolumne	7	11	48
Ventura	7	1	28
Yuba			3
Totals	162	179	2,526

BOUNTY.

The constant demand for an increase in the bounty paid by the Fish and Game Commission so that remuneration would be sufficient to make lion hunting worth while, has led the commission to increase the bounty on female lions from $20 to $30 beginning July 1, 1917. All claimants for bounty must adhere to the following requirements:

The entire skin, with evidence of sex attached, of the mountain lion upon which a bounty is claimed, must be sent to the office of the Fish and Game Commission, San Francisco, all express or mail charges prepaid. Where only the scalp is sent, or in case the sex can not be positively determined, a bounty of but $20 will be allowed. The skin should be either dried, tanned, or otherwise cured before shipment, as green skins spoil quickly, becoming very offensive and losing all value. Offensive green scalps or skins, or those sent charges collect, will not be accepted.

All hides and scalps received by the Fish and Game Commission will be destroyed unless full directions are given for return to claimant, or for other disposition. A tag with name of claimant, together with shipping directions thereon, should be attached to hide or scalp. All return shipping charges must be paid by claimant or other person receiving package.

A claim must be made for each animal, upon a form provided by the Fish and Game Commission, whereupon must appear the names and addresses of the claimant and three witnesses. This claim must be acknowledged before a notary public or justice of the peace, and must bear the county clerk's certification to the genuineness of the justice's signature. If sworn to before a notary public this will not be required. Affidavits of witnesses are not required.

The claim must be accompanied by an account of the pursuit and killing of the lion, giving in detail the method used, number of deer carcasses left by the animal, and such other facts as may be of assistance to the commission in determining the damage done to deer and other game. Claim blanks will be sent upon receipt of written application to the Fish and Game Commission.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

October 27, 1917.

The study of birds has a remarkable educational value and should be advocated not for the sake of the birds alone, but for the good of the children. It gives to many of them a new outlook, a new interest in life, and develops their observational faculties in the natural way.—*E. H. Forbush.*

HIGH COST OF FISH.

There are three good reasons why Californians have to pay high prices for fish:

1. People in California do not subsist to any great extent on fish as do the people of many foreign countries.

2. Californians seldom eat fish in summertime when large catches are made and when prices are low; on the contrary, demand is increased in winter when large catches are least often made.

3. Many people eat fish on one day a week only. As a consequence, fish dealers have to charge enough on these days to make up for those not sold on other days of the week.

VALUABLE INFORMATION FOR ALBACORE INDUSTRY.

The investigations on the albacore industry instituted by the Fish and Game Commission are bearing fruit. In this number of CALIFORNIA FISH AND GAME (page 153) Mr. Will F. Thompson points out that there is a correlation between the catch of albacore and the temperature. It is needless to state that if this point can be substantiated albacore fishermen will have the information they have desired for so long. The ability to predict the catch and dependable information on the location of the albacore at all times of the year seems an immediate possibility.

BAY REGION FISHERMEN LUCKY.

The far-sighted policy of the Fish and Game Commission in introducing new food and game fishes into the waters of the state is evidencing itself in a new way. Because bluegill sunfish and calico bass were planted in the Sacramento and San Joaquin rivers about ten years ago, the delta region has become a fisherman's paradise. The bluegill sunfish and calico bass now swarm in the sloughs and fishing is reported as excellent in Whiskey, Potato, and many other sloughs. These fish readily rise to a fly. They are game, too, and the same sort of sport which is sought by the fly fisherman can now be obtained within fifty miles of San Francisco. Many believe the bluegill and the calico bass to be better flavored and more palatable than trout. The finest of fishing grounds are therefore accessible to everyone in the bay region. All who will arm themselves with an angler's license, a rod, midget flies, and who choose some "blind" slough at low water, can bring home the limit, and at the same time enjoy sport superior in some respects to that found on the mountain streams.

MILLIONS OF POUNDS OF SARDINES CANNED.

Unheard of catches of sardines have been made along the coast of southern California this past spring. The canneries which heretofore have been idle except during the run of tuna have been busy putting up tons of sardines. Up to the middle of June 60,000,000 pounds of sardines have been canned, this being three times the amount canned during 1916. It is expected that the amount already canned will be doubled by the end of the year. Until recent years the salmon fishery was the largest in the state; later, the sardine fishery forged ahead. In 1916 the tuna fishery of southern California loomed up as the principal fishing industry, 30,000,000 pounds being canned. In 1917 the sardine industry undoubtedly will hold first place.

California sardines are just as good as the imported ones. In fact, one gets more for the money because of the fact that our sardines are of larger size. Most of the California sardines are put up in pound cans retailing at 20 cents, but they can also be obtained in the usual flat cans.

Our nation is wisely turning in the food crisis to the resources of the sea. "Old ocean" has a full larder and we can easily draw upon that larder to feed ourselves and our allies as well.

WHALE MEAT—VENISON OF THE SEA.

A whale is now valuable not only for its fat, but for its flesh as well. Each California gray whale will produce about ten to twelve tons of fresh meat. Formerly this meat was unutilized; now it finds its way to the markets. During December, January and February, 1917, eight whales were captured off the coast of southern California. Some of the meat from these whales retailed at fifteen cents a pound. Some of it was canned. Although in early days used in part by the whalers for food, in more recent years nothing but the oil has been taken from the whales killed. The meat is more tender than beef, is very palatable and exceedingly nutritious. It should be remembered that a whale is not a fish, but a mammal. Hence it is no wonder that whale meat tastes like tenderloin. The canners of southern California have been anxious to put whale meat on the market under a trade name, because the uninitiated appear to be afraid to try this new food, but the government will not allow it to be mislabeled.

Modern whaling is carried on with a sixty-foot boat, with powerful engines, and the instrument which does the killing is a Norwegian harpoon gun. After a whale is towed into port the whole carcass is utilized even to the bone and skin. The bone can be used in the manufacture of buttons and there is evidence that the skin can be converted into leather. The blubber from an average-sized whale will make about 160 barrels of oil valued at thirty dollars per barrel.

Doubtless we have been missing one of the choicest products of the sea and before long we wil find that whale meat is one of the greatest delicacies, selling at fabulous prices. Now is the time to pass your judgment on the "venison of the sea."

JUSTICE METED OUT.

In view of the miscarriage of justice so often seen when murderers of game wardens escape penalty, we are very glad to report that Nino Lombardo has been sentenced to life imprisonment and the other murderer of Deputy Ray Heacock, Dimmaggio by name, to ten years in San

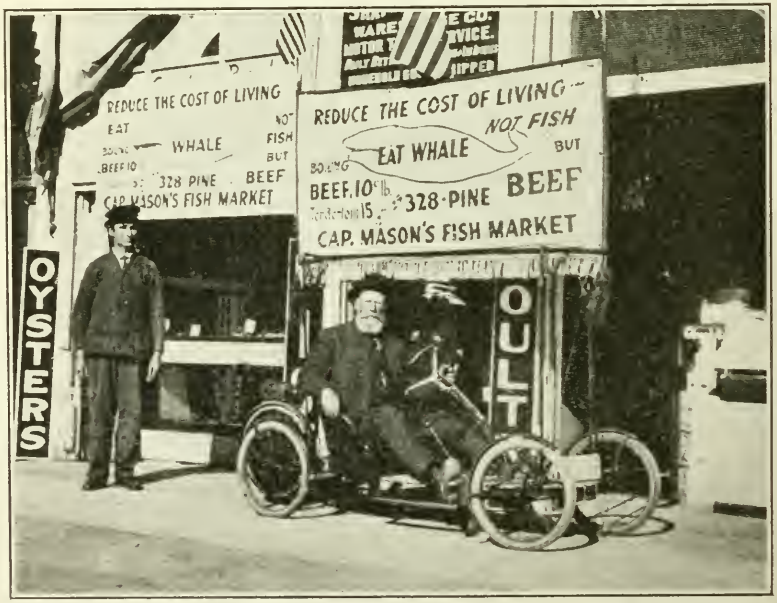

Fig. 72. Advertising whale meat in Long Beach, California. The whale should furnish cheap and nutritious meat during the present war emergency.

Quentin. The appeal originally made was dismissed and these men are now serving their sentences. A third man implicated in the murder will be tried in October. It will be remembered that Deputies Ray Heacock and Richard Squire were murdered by Italian fishermen while doing patrol duty near Terminus, San Joaquin County, last December.

BROUGHT TO JUSTICE.

John W. Guelph of Sierra Madre recently was fined $50 by Judge McDonald of Pasadena for killing a deer out of season and for killing a spike buck. Neither Mr. Guelph's claim of relationship to the royal family of England nor his contention that the deer were destroying his property saved him from the fine.

IN MEMORIAM.

LEO N. PETTIT.

Mrs. Leo N. Pettit, an employee of the Fish and Game Commission for sixteen years, died at the Roosevelt Hospital, Berkeley, in the early morning hours September 11, 1917.

Mrs. Pettit was one of the most valuable and conscientious employees of the Fish and Game Commission. She entered the service as a stenographer and on account of her earnest application to her work and her peculiar fitness, she was advanced and at the time of her death held the very important position of chief clerk.

All with whom she came in contact were impressed with her thoroughness and ability. A capable business woman and a true friend, she is mourned by her associates and friends innumerable.

Mrs. Pettit is survived by a son, Jack, her mother, Mrs. N. L. Nielson, and a brother and sister.—J. S. H.

THE PASSING OF A PIONEER.

Samuel Nickel, watchman, spawn-taker, fisherman, employed for years by the California Fish and Game Commission, was stricken with paralysis in his cabin on Camp Creek, Siskiyou County, on August 26, 1917. He was removed to a hospital in Yreka, where he passed to eternal rest on the twenty-eighth day of August, 1917. Mr. Nickel was born in Ohio in 1833; came across the plains to California in 1849; engaged in mining in California and Nevada for a number of years. He

Fig. 71. Samuel Nichol, for many years a faithful employee of the Fish and Game Commission in the capacity of watchman and spawn-taker.

moved to Lake Tahoe thirty-five years ago, where he engaged in lumbering, fishing, trapping and pursuits generally followed by mountaineers. He was first employed by the Fish and Game Commission in 1890 as a fisherman for spawn fish at the egg collecting station on Lake Tahoe. He assisted in this work for a number of years. Three years ago he was transferred to the Klamath stations of the Fish and Game Commission, where he was engaged as watchman and spawn-taker up to the time of his death.

Sam Nickel was a lover of nature, a true sportsman, a faithful and loyal friend. The employees of the Fish and Game Commission who were associated with him in his work will long remember his kindly nature and genial disposition. He lives in our memory and in the memory of those who loved him. He leaves a sister and two nieces to mourn his death.

THE CLEAN RECORD.

"There is nothing in all the world sweeter than the memories of an old sportsman whose record is clean, nothing more poignant than those of one whose is not. Let every word and deed said and done in the name of sport be such that as memories they will bring not the least regret. Be patient, be kind, be generous, be fair, that when your hair is white your heart may be warmed by dreams of days in Been-There Land."—*The Conservationist*, March, 1917.

OREGON LIBERATES MANY GAME BIRDS.

The Oregon Fish and Game Commission has enlisted the aid of farmers, ranchmen, and country estate owners in restocking the state with game. Game birds are being reared by private individuals in every county of the state.

The census of game birds liberated in 1916 is as follows: Chinese or ring-necked pheasants, 2,914; bob white quails, 973; California valley quails, 959; mountain quails, 142. As a result of this plan, stimulation of private breeders netted a total of 4,988 game birds.

Not only does such cooperation mean an increase, but it binds more closely into a common cause the public and the State Fish and Game Commission.

BIRD PROTECTION SIGNS DISTRIBUTED.

Those wishing to prevent shooting on their premises will be interested in cloth signs issued free of charge by the National Association of Audubon Societies, which read as follows:

SHOOTING ON THIS PROPERTY IS PROHIBITED.
WAR.

PROTECT THE BIRDS AS A WAR MEASURE!

The food destroyed in America by insects and small rodents would feed the people of Belgium! Birds are the great natural enemies of these pests. The laws of the state and of the nation protect insect-eating birds, but many are being shot wantonly and for food. Report violations to the nearest game warden or to the address given below.

NATIONAL ASSOCIATION OF AUDUBON SOCIETIES
1974 Broadway New York City

AGE OF DEER DETERMINED BY TEETH.

In the 1916 Biennial Report of the State Fish and Game Commissioner of Vermont attention is called to a method of determining the age of Virginia deer by their teeth. The Vermont law provides that it is unlawful to kill "an animal of the first year." It is therefore necessary to distinguish fawns from yearlings. A collection of jaws, obtained by a taxidermist, indicates that the length of the jaw and the character of the teeth is a more dependable means of determining age than the number of points on the antlers. The following interesting table gives measurements of nine jaws:

Number	Length of jaw	Number of points	Width of antlers
1	6½ in.	Fawn	Fawn
2	8 in.	2 spike horn	8 in.
3	8¼ in.	4	11 in.
4	8½ in.	6	14 in.
5	8¾ in.	6	17 in.
6	8¾ in.	8 heavy	20 in.
7	9½ in.	10 heavy	19 in.
8	9¾ in.	10	22 in.
9	10 in.	8 uneven	23 in.

Although of possible value as a means of ascertaining the age of a deer already killed, we fail to see how this method can

be employed in judging the age of deer in the wild, a necessity under the present Vermont law.

AN OBJECT LESSON.

Vermont has again demonstrated what conservation can do for deer. The last report of the Fish and Game Commissioner states that 6,042 deer (bucks and does) were killed during the open season of 1915. When it is known that the area of Vermont is less than one-seventeenth that of California, we are led to ask the question: "Why is our estimated kill of 12,000 buck deer per year not larger?" The total absence of mountain lions in Vermont may in a measure account for the discrepancy. The toll taken by mountain lions in California if added to our kill of deer would materially increase the total.

AMBERGRIS.

The finding by a fisherman upon San Francisco Bay of a mass of material that had the appearance of ambergris led to an investigation whether or not this substance was found along our coast. Upon applying the old test of the insertion of a hot needle to draw forth a peculiar musky scent and to show a fatty consistency, the fisherman's discovery did not prove to be ambergris, and as far as we have been able to find out, this valuable substance has never been procured in quantity on the California coast.

To those not familiar with the word we offer the following facts gleaned from Scammon's "The Marine Mammals of the Northwestern Coast of North America."

Ambergris has for many years been the basis for a great number of perfumes. Although quantities have been obtained sufficient for such use, yet the source of the substance was a mystery for many years. Great masses of a yellowish, transparent substance was found in considerable quantities floating in the Indian Ocean or along its shores; lesser quantities have been found in other parts of the world.

The demand for this commodity is indicated by the high price paid in 1791, $6 per ounce. As early as the sixteenth century it was valued by the English. At that time a queer myth of its source existed in the tradition that ambergris issued from the root of a tree, which shot its roots towards the sea, and later by the washing of the warm waters the gum was cast upon the shore. Somewhat later in the century we find the term "ambergriese" associated with the whale, for one Dr. Thomas Brown attests that great lumps were found by the leviathan and swallowed.

In these same days country doctors resorted to powdered whale's tooth as a cure for smallpox and other diseases. The medicinal properties of ambergris were recognized also, and doses of unadulterated ambergris were prescribed in quantities of thirty grains; indeed, a sailor is said to have tried its efficacy by taking half an ounce.

Ambergris is now known to be the excreta of the sperm whale, a fact well proved by its being composed very largely of the remains of squid.

SCIENCE IN THE INCREASE OF BIRD LIFE.

Thoughtless destruction of birds and a decrease in numbers owing to altered conditions, has brought about an interest in methods of attracting birds. Oftentimes the man who is planning a country home is desirous of knowing how birds may be attracted to his place. The United States Department of Agriculture has been helpful in furnishing several bulletins dealing with food plants. Methods of furnishing an increased food supply during the winter season have also been developed in this country.

However, it has been left to a man in Seebach, in Thuringia, to work out practical measures for increasing bird life in a limited area. This man, Baron von Berlepsch, working on the theory that the most important step for bringing about the successful protection of birds consists in establishing suitable conditions of life and, above all, opportunities for building nests, has evolved a certain scientific practice. The results obtained clearly demonstrate the practical value of the methods used.

Chief among these methods are the planting of shelter woods and hedges and the proper pruning of these to furnish nesting places. In addition, such common sense measures as the leaving of fallen leaves to provide increased food

for birds by furnishing food and hiding places for insects, the placing of brush and woodpiles and the delay of pruning until after the nesting season, are utilized.

Any one desiring to introduce special measures for the protection of birds should see one or all of the following:

"How to attract and protect wild birds." Martin Hiesemann. 100 pp. Witherby & Co., London, 1912.

"Attracting birds." Gilbert H. Trafton. 172 pp. National Association of Audubon Societies, 1974 Broadway, New York City.

Bulletin No. 1, National Association of Audubon Societies, "Attracting birds about the home."

A LETTER TO A GAME WARDEN.

Frequently the Fish and Game Commission and its deputies receive amusing letters. A complaint recently received by Deputy Harris, Yreka, California, reads as follows:

"G. W. Harris, the so culled "white-Injins," are killing a way over their limit

Pretty soon no more Deer aller same Hen's teeth.

Black Klamath injin."

CIVIL WAR VETERANS OBTAIN LICENSES FREE.

At the last legislature both the hunting and angling license acts were amended to the effect that licenses be issued to Civil War veterans at no cost to them. In order to keep the records clear, however, it has been found necessary to issue such free licenses only at the district offices of the Fish and Game Commission at San Francisco, Sacramento and Los Angeles. No licenses will be issued to Civil War veterans at the offices of county clerks or at other places where licenses are ordinarily sold.

THE BOY WITH A GUN.

Whenever I am asked by some bird lover how boys can be prevented from shooting birds with air guns, I reply: "A boy with a gun is like a cat—everything is prey that wears feathers. Here is the only effective remedy: Teach bird study in the schools as a part of the conservation of national resources. Get children organized into bird clubs. A boy is not likely to kill birds if he knows one from another, is interested in their lives, and has done something for the birds and received pleasure from them. The state protects all birds except eight, and you can report violations of the law to the game warden, or to the president of the Audubon Society. But the latter course will avail little, as long as people are ignorant of birds.

"The present game laws are not better enforced because they are not supported by public opinion and because one game warden can not adequately patrol a territory half as large as Massachusetts. If every bird were protected and a property owner allowed to kill only those birds that he found actually doing damage, then every boy or hunter with a gun would not have a practical license to kill every bird he sees, as he does under the present law. Three hawks and one owl are now unprotected, and as a consequence every hawk and every owl are killed for sport. The other day a man in Mission Valley, San Diego County, was killing the harmless fly-eating black phoebes because he "thought they were butcherbirds." Can you tell me what damage butcherbirds could do that man?" They gorge themselves on Jerusalem crickets, which are enemies of every root crop. Change the present law. Make every policeman, constable, and forest ranger a game warden. Have a couple of mounted policemen to ride over the county as they do in Canada. Teach bird study in the schools. Then you will get somewhere with bird protection."—C. D. Scott.

REMEMBER THE BUFFALO.

Commercialization of wild life leads to extermination. Evidence of the extent to which the buffalo was commercialized in former times is to be found in the following poster issued by the Burlington and Missouri-River Railroad Company and distributed in England in 1871. We are indebted to Mr. Kenneth Watson, a prominent insurance man of San Francisco, for the privilege of seeing the original. The poster is a most interesting side-light on the causes of extermination of one of America's largest and finest game mammals.

GRAND BUFFALO HUNT.

A Grand Buffalo Hunt will be held in September next, on the prairies of NEBRASKA and COLORADO, United States, and through the magnificent valley of the Republican River, the rich alluvial feeding grounds of the Buffalo.

The valley of the Republican River possesses some of the most varied and magnificent scenery in America, the wild pastures are rich in grasses, and it is most beautifully wooded and watered by clear streams and rivulets. The southern portion of Nebraska, through which the Republican Valley passes, will bear comparison either for climate, soil, or picturesque scenery, with any country.

The Burlington and Missouri-River Railroad Company own some millions of acres of land; is one of the most wealthy and influential Corporations in the Western States of America, and will aid and assist this Hunting Party in every way, in order that the Sportsmen of England may see the Western Country; and, on their return, be able to corroborate the statements as to climate, accommodation provided by them, and the gigantic advancement made in cultivation and general improvements in so new a country, for at least 200 miles from the Missouri-River.

Mr. CHARLES S. DAWSON, of the Burlington and Missouri-River Railroad Company, who left England last April, has made arrangements in Nebraska with Mr. Ward Manley, and a corps of Western Hunters, Trappers, and Scouts, of the Western Frontier of the United States, for a Grand Hunt on the plains of Nebraska and Colorado, and in the valley of the Republican River, where Buffalo, Elk, Antelope, Red Deer, Beaver, Otter, Wild Turkey, Prairie Chicken, &c., abound in large numbers; the Buffalo in herds of from 3,000 to 10,000. THERE ARE NO HOSTILE INDIANS IN NEBRASKA WHATEVER; friendly chiefs of the Otoes, Pawnees, &c., will accompany the party.

The Commissariat will be in charge of Mr. J. N. Townley, of the Tichenor House, Lincoln, Nebraska, at which place the passengers will rest a day after the journey, make preparations for the Hunt, and leave their heavy baggage. Mr. Townley will be accompanied by an efficient corps of cooks, men to pitch and strike camp, and attend to baggage. Sportsmen will be provided with army tents and beds during the Hunt, and everything generally found in a first-class Hotel. There will be servants to take care of the horses, and in fact all arrangements have been made to give the Hunting party the greatest amount of pleasure with the least possible trouble.

The party will be accompanied from Liverpool, by Mr. Dawson. His assistants will take charge of the baggage through to Lincoln, Nebraska.

The magnificent Steamer, *Atlantic*, of the White Star Line, leaving Liverpool, 12th September, has been selected to convey the Hunting Party to New York, whence they will be taken by Express Train of Pullman Palace Drawing Room and Sleeping Cars, via Pennsylvania Central R. R., across the Alleghany Mountains and Indiana to Chicago—where time will be allowed to view the burnt City—then across the highly cultivated Prairies of Illinois to Burlington, Iowa, at which point the Mississippi River is crossed, where the cars of the Burlington and Missouri-River Railroad Company, to which a Dining Room Car will be attached, will convey the party over the mighty Missouri, and the State of Iowa, to Lincoln, Nebraska.

Parties may, if they wish, return by way of "Niagara Falls," and thus see one of the grandest sights in the world.

Wagons will be provided for the conveyance of any trophies of the chase, such as Buffalo Skins, Elk Horns and Antlers in limited quantity.

The man of science looks to America as the best field wherein to investigate the changes which have affected this earth. In Europe, and more particularly in Great Britain, this is difficult to do. It is where nature is still free that he seeks to discover the great facts of natural progress. The antiquarian can find there ample opportunities for pursuing objects of interest to him, for there is no land so rich in traditionary lore, and abounding in so many relics of a bye-gone age and race, as that of the United States of America. The sportsman has there a field of nature's own planting on which to roam in pursuit of his healthy and invigorating pleasures; and where can the lover of scenery find greater, grander, lovelier views than are to be found on the Continent of America?

FARE — For the Round Trip of about Seven Weeks including every expense, except Wines, Liquors, Cigars, Guns, Rifles, and Ammunition, 90 Guineas.

The arrangements will be such as to admit of Ladies joining the party, but the charge for Ladies will be 100 Guineas each.

For further particulars apply to

The Burlington and Missouri-River Railroad Company,

16, SOUTH CASTLE STREET, LIVERPOOL;
25, MOORGATE STREET, LONDON;
59, ROBERTSON STREET, GLASGOW.

C. R. SCHALLER,

EUROPEAN COMMISSIONER FOR THE BURLINGTON AND MISSOURI RIVER RAILROAD COMPANY.

CANNING SEA MUSSELS.*

The sea mussel is of all the shellfish particularly adapted for canning. Unlike the oyster, it remains tender and retains its full flavor when subjected to the high temperatures necessary to prepare it in this way. The process which has been devised as most feasible is as follows:

The mussels when taken from the collecting boats are rapidly picked over by hand to eliminate any dead or unhealthy ones which may be present, as well as the coarse adhering debris. Then they are placed in a cleaning apparatus. * * * It consists of a rectangular box 2 x 2 x 3 feet, which revolves on its long axis. The ends of the box are of solid yellow pine and are firmly held in place by four pairs of braces 3 feet long, 2 inches wide, and ½ inch thick. Three sides of the box are inclosed with ¾-inch mesh galvanized wire netting. The fourth side has a door 8 inches wide, running the length of the box. The door is clamped firmly in place by means of a lever, which is swung over it. The rest of the side is filled in with parallel strips of wood placed ½ inch apart. The projecting ends of the axis rest on the walls of a trough 1½ feet deep, in which there is running sea water. A crank at one end serves as a means to rotate the cage.

About one bushel of mussels is placed in this cleaning apparatus, which is set in rotation at the rate of thirty revolutions a minute for fifteen minutes. The treatment cleans off from the shells all clinging seaweeds, sand and debris, besides breaking open the shells of dead mussels and washing away the injurious substance contained within them. In the experimental work this method of cleaning mussels proved very effective. For cleaning on a commercial scale the device may easily be constructed on larger dimensions and operated by means of steam or water power.

After this treatment the mussels are removed and rinsed off with clean water. They are placed in a chest and subjected to live steam for from five to ten minutes, or until the shells begin to open. They are next emptied out into shallow pans to cool and the natural liquor which has escaped into the chest is preserved in a separate dish. As soon as they are cool enough to be handled, the mussels are shucked and the horny "beard" removed, the meats and liquor being preserved in separate dishes.

While the liquor taken from the steam chest and that taken from the mussels during the process of shucking is filtering through a fine-meshed cloth, the mussel meats are packed in glass jars or bottles. The filtered liquor is brought to a boil and two ounces of salt are added for each gallon. The jars containing the meats are then filled with the boiling liquid and sealed. To insure complete sterilization, the sealed jars are placed in a steam chest and subjected to five pounds pressure for fifteen minutes. They are allowed to cool down slowly and when the temperature has fallen to about 100 degrees F. they are removed and set aside for future use.

Persons wishing to can mussels for use in their own homes and who lack the facilities described in this process, may do so by modifying the method in the following way: After thoroughly cleaning the outsides of the mussels by means of a stiff-bristled brush, rinse them in clean water and place them in a large, closely-covered kettle with a little water covering the bottom—about one cup of water to each gallon of mussels. Place on the stove and bring to a boil, continuing the cooking for about fifteen minutes, or until the top shells have opened. Pour out the liquor that has collected in the bottom of the kettle and preserve it in a separate dish from the mussels. Shuck the mussels, being careful to remove the byssus or horny tuft of threads growing out from the base of the foot. While the liquor is filtering through a fine-meshed cloth pack the meats in pint or half-pint glass jars of the ordinary household type. To each quart of the filtered liquor add one heaping teaspoonful of salt and bring it to a boil. Pour the boiling liquid over the mussel meats, filling the jars to the brim, and then quickly clamp or screw on the lids. The jars should next be placed in a large vessel, such as a washboiler, containing boiling water, and left to boil for at least half an hour. At the end of this time the vessel with its contents should be removed to the back of the stove and allowed to cool. As soon

*The Food Value of Sea Mussels, by Irving A. Field, in the Bulletin of the Bureau of Fisheries, Vol. XXIX, 1909, pp. 111–113.

as convenient the jars may be removed and the tops tested to see that they are sealed air-tight. Treated in this manner, the mussels ought to keep for many months and preserve their natural flavor. When desired for use on the table they may be prepared according to almost any of the methods employed in preparing the fresh mussels for food.

SWORDFISH AND TUNA FISHING EXCELLENT.

The famous game fishes of southern California—the tuna and broadbill swordfish—have been furnishing excellent sport this season. At Catalina Island during June but one tuna was hooked. During July fourteen were caught, and in August 291. During the same period eight broadbill swordfish were landed on regulation tackle, and several marlin swordfish took hooks, but succeeded in getting the better of the anglers.

PETS, THEIR HISTORY AND CARE.

Every person interested in keeping pets has doubtless noted the lack of printed information on their care. At last there has been published an excellent book which contains just the information desired by the average person interested in pets. The author of the book, which is entitled "Pets, Their History and Care," is Mr. Lee S. Crandall, assistant curator of birds, New York Zoological Park, a man who has had wide experience in the care of birds and animals in captivity.*

The introductory paragraph of the preface aptly points out the value of fostering the interest of children in keeping pet animals. Mr. Crandall says:

"Every normal child, of whatever race or creed, is born with an innate love for wild things. If allowed to languish from lack of intelligent parental interest and supervision, this natural instinct is gradually lost or degenerates into the unintentional cruelty of ignorance. Properly fostered and developed, it is certain to exert a beneficent influence on the trend of developing character. Given scope and sympathetic guidance, the young mind is trained to observe and appreciate the subtle ways of nature, an accomplishment which, in later years, will prove, if nothing more, a welcome diversion. The sterling qualities of kindness, responsibility and regularity are required, and many of the problems which perplex the adolescent adjust themselves normally by constant contact with reproductive life."

With the exception of a few such animals as the lamb, calf and colt, whose care is well understood, practically all those birds and mammals which make successful pets are given treatment. Although certain birds, such as pheasants, cranes and waterfowl, can not be considered as pets in the sense that they may be fondled, yet because of the fact that they are kept for ornaments and their proper treatment is not well known, they are included. The reader is asked to rely upon works of natural history for detailed description and for wild habits, in that captivity is the keynote of the book.

In each chapter emphasis is placed on general care of the different groups of animals and birds and special treatment, including feeding, is given under the head of each species. Under mammals, chapters are devoted to dogs, cats, rabbits, guinea pigs, rats and mice, and small wild animals. Under the section devoted to birds can be found information on pheasants, peafowl, quail, pigeons, doves, cranes, waterfowl, hawks and owls, parrots, cage birds, canaries and bantams. Another section is devoted to reptiles and batrachians, and a fourth to the aquarium.

Although recommending that any creature seriously ill should be treated only by a trained person, yet a valuable chapter is devoted to birds' diseases. It is interesting to note that the medicines used are, without exception, the same as those used for like ailments in man.

The appendix contains a brief but interesting statement of the "Theories of Breeding," attention being called to Mendel's law, to selection, and to inbreeding. A valuable list of practical reference works concludes the volume.

Of particular interest to the casual reader are some of the facts regarding the history of some of our commoner pets. Here we find mention of the wild ancestors of the dog, cat, guinea pig, and other animals and birds. To the child or the grown-up who wishes answers to such questions as "Where did our dogs come

*Pets, Their History and Care, by Lee S. Crandall; Henry Holt & Co., New York, 1917; 372 pp. illus.

from?" "What does a monkey eat?" "What type of cage is best for young birds?" "How are young ducks reared?" "What species of parrot is the best talker?" "What other birds besides parrots learn to talk?" and "What sort of canary is the best singer?" now have their questions answered in "Pets, Their History and Care."—H. C. B.

CALIFORNIA CONDOR ON EXHIBITION IN GOLDEN GATE PARK, SAN FRANCISCO.

Although the condor is the largest land bird that flies in California, and was once so plentiful that everyone was acquainted with the bird, yet at present it is limited to a few districts, and there are but few individuals who see the bird.

During June, 1917, a vaquero named Rocky Digges discovered one of these huge birds feeding on the flesh of a dead horse in Monterey County. He waited until the bird had become fully gorged with food before attempting to lasso it. Before the condor could take its needed run to rise in the air, his lariat fell around its neck, and the bird was taken captive.

As an earnest attempt is being made to carefully protect this bird, it was confiscated by the Fish and Game Commission and turned over to the California Academy of Sciences. The academy in turn had it placed in the aviary at Golden Gate Park, San Francisco, where thousands may view the fine living example of California's largest bird.

FUNCTION OF THE GAME AND FISH DEPARTMENT.

The function of the Game and Fish Department is to coordinate and employ all agencies that tend to arrest the destruction of wild life and to encourage every attempt at building up this resource. It should not be merely a police department, but an administrative branch of the state government engaged actively in constructive work in cooperation with all other organizations and agencies.—*Fins, Feathers and Fur*, December, 1916.

USUAL REPORTS NECESSARILY OMITTED.

The death of Mrs. L. N. Pettit, chief clerk in the San Francisco office, an efficient and loyal employee of the Fish and Game Commission, has made it impossible to publish the usual financial reports. They will appear in the next number.

HATCHERY NOTES.

W. H. Shebley, Editor.

TROUT FRY DISTRIBUTION, 1917.

During the month of May the distribution of trout fry from the different hatcheries was commenced. This work has been completed at most of the smaller stations, and the hatcheries closed for the season. At the larger hatcheries, however, distribution operations will not be completed until the middle or latter part of October.

SNOW MOUNTAIN STATION.

After completing the egg collection operations at the Snow Mountain Station, during the latter part of May, it was found that in excess of 6,000,000 steelhead trout eggs had been taken. The eggs were "eyed" and shipped to Mount Shasta, Mount Whitney, Fort Seward and Ukiah hatcheries, to be hatched, reared and distributed in the streams suitable for this variety of trout. Two hundred thousand of the eggs were retained at Snow Mountain Station, where they were hatched and distributed in several of the tributaries of South Eel River, above the Snow Mountain dam.

UKIAH HATCHERY.

A half million steelhead trout eggs were shipped from Snow Mountain Station to Ukiah Hatchery, and during the months of June and July were given a wide distribution in the waters of Mendocino and Sonoma counties.

FORT SEWARD HATCHERY.

Steelhead trout eggs to the number of 1,350,000 were shipped to Fort Seward Hatchery from the Snow Mountain Station, and in addition to this number, 150,000 rainbow eggs were received from the Domingo Springs Station in Plumas County. The work of distributing the resulting fry was commenced during the fore part of July. Most of the fry have now been distributed, the many streams of Humboldt County receiving most of the fish. A couple of shipments are yet to be made to streams in Del Norte County, but this work will probably be completed by the middle of September.

BROOKDALE HATCHERY.

The Brookdale Hatchery was closed about the middle of July after completing a very successful season. Most of the steelhead trout eggs collected at Scott Creek Station and "eyed" at Brookdale Hatchery were shipped to the Mount Shasta Hatchery, but approximately 900,000 were hatched out at Brookdale and distributed in the streams of Santa Clara and Santa Cruz counties.

ALMANOR HATCHERY.

The half million rainbow trout eggs hatched at Almanor Hatchery were distributed during the month of July in the streams of Lassen County and tributaries of Lake Almanor, Plumas County. The hatchery was closed and the crew was transferred to the Domingo Springs Station on Rice Creek, Plumas County.

DOMINGO SPRINGS STATION.

The take of rainbow trout eggs at Domingo Springs Station amounted to 850,000. A portion of them were shipped to the Mount Shasta and Fort Seward hatcheries, and the remainder were hatched and distributed in some of the lakes and streams of Plumas and Lassen counties. The crew is at present engaged in making repairs and improvements to the racks, traps, and living quarters of the assistants. The eyeing station is being moved to a more desirable location where a better supply of water from Rice Creek may be obtained.

BEAR LAKE HATCHERY.

The Bear Lake Hatchery was closed August 25, after completing a very successful season. The 875,000 rainbow trout fry hatched at the station this season were given a wide distribution in the streams of San Bernardino County and in Big Bear Lake. The commission is planning to increase the size of the egg collecting and eyeing station at Bear Lake this fall, and if a lease can be obtained from the heirs of the North estate (on whose property the station is located) for a term of years, the new station will

be constructed before the winter storms set in. It is planned to construct a 48-trough eyeing station and suitable living quarters for the employees. With adequate facilities for collecting and "eyeing" the eggs, it is expected that a large number of rainbow trout eggs will be taken from Bear Lake next season.

TAHOE HATCHERIES.

Egg collecting operations at the Tallac Station this season were very successful, 4,250,000 black-spotted eggs being taken. Of this number 1,000,000 were shipped to Mount Shasta Hatchery, 250,000 to Mount Whitney Hatchery, 775,000 were transferred to the hatchery at Tahoe City, and the balance were hatched at the Tallac Hatchery. The resulting fry were given a wide distribution in streams of El Dorado County and in streams tributary to Lake Tahoe in El Dorado and Placer counties. The eggs shipped to the hatchery at Tahoe City were hatched and the fry are now being distributed in the streams of Placer and Nevada counties. A shipment of 250,000 rainbow trout eggs was made from the Domingo Springs Station to the Tahoe City Hatchery, and the resulting fry will be distributed in streams and lakes in the vicinity of Lake Tahoe and in the Truckee River.

WAWONA HATCHERY.

Wawona Hatchery was opened for operations during the fore part of May and 75,000 steelhead and 150,000 rainbow eggs were shipped to the station from the Snow Mountain and Mount Shasta hatcheries. The resulting fry were distributed in the streams of the Yosemite Valley during the latter part of July and the fore part of August. The station was closed on August 18.

MOUNT SHASTA HATCHERY.

The two fish distribution cars have been busily engaged in the work of distributing the fish from the Mount Shasta Hatchery, and it is expected this work will be continued well into the month of October. Approximately 10,000,000 trout fry will be distributed from Mount Shasta Hatchery in the streams of California this season. After the completion of the trout distribution work, the quinnat

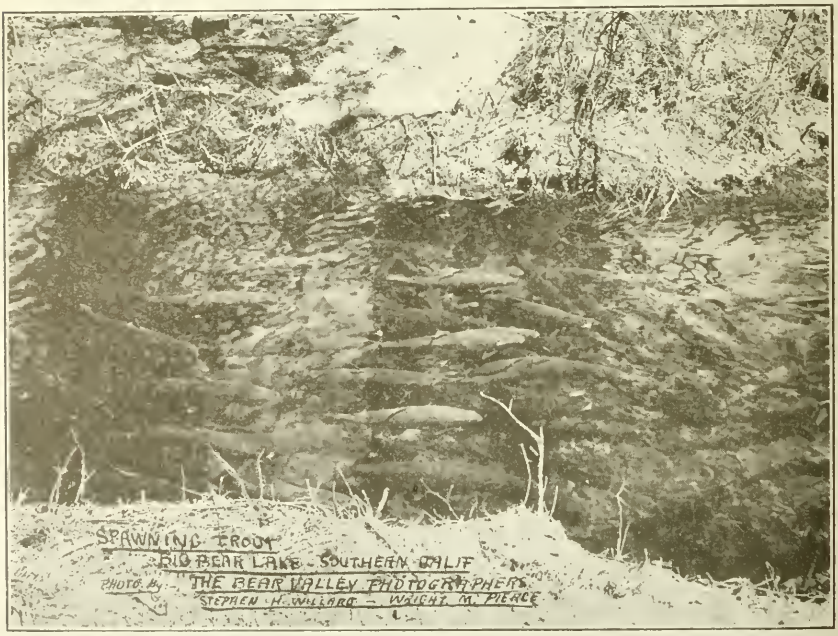

Fig. 73. Spawning trout in Bear Lake, San Bernardino County, California. Photograph by Messrs. Willard and Pierce.

sa'mon, which are being retained in the large rearing ponds and lakes, will be distributed in the upper reaches of the Sacramento and Klamath rivers.

MOUNT WHITNEY HATCHERY.

On September 23 distribution car No. 01 will be detached from the Mount Shasta Hatchery distribution work, and will be sent to Mount Whitney Hatchery to commence the distribution of the trout fry from that station. The 250,000 black-spotted and 750,000 steelhead trout eggs which were shipped to Mount Whitney Hatchery early in the season have hatched, and the resulting fry are exceptionally strong and healthy. Four hundred fifty thousand rainbow trout eggs were taken at the Rae Lakes Station, an auxiliary station to Mount Whitney Hatchery, and were transported by pack animal to the hatchery. It was not until very late in the season that the spawning crew was able to get into the Rae Lakes section to open up the station, owing to the heavy fall of snow which blocked the Oak Creek Pass. The take of eggs was therefore very light, as a considerable percentage of the fish had already spawned.

As soon as the distribution car arrives at the Mount Whitney Hatchery, distribution operations will be commenced. The fish will be shipped to applicants of southern California and of lower San Joaquin Valley counties.

SCREEN AND FISHWAY INVESTIGATION.

During the past three months, the screen surveyor has been engaged in making new surveys of all the canals and ditches in the counties of Butte, Contra Costa, Fresno, Kings, Lassen, Madera, Mariposa, Merced, Modoc, Shasta, and portions of Siskiyou, Stanislaus, Tehama and Tulare counties, and preparing notices to be served on the owners of the same to install suitable screens in accordance with the new law passed at the last session of the legislature.

The ladder surveyor has made a number of surveys and prepared plans for fish ladders to be installed over dams in the counties of San Luis Obispo, El Dorado, San Mateo, Napa, Shasta and Butte. The fish ladder over the Alta Bert Dam, property of the Trinity County Water and Power Company, in Trinity County, was completed during the mouth of August.

COMMERCIAL FISHERY NOTES.

N. B. Scofield, Editor.

CALIFORNIA'S COMMERCIAL FISHERIES.

Commercial fisheries of California are enjoying general prosperity and it is now certain that the catch for 1917 will reach 200,000,000 pounds, which is about double that of 1916. The salmon catch has not come up to expectations, but the tuna catch will be about double, and with the present high prices the pack will have a wholesale value of over $5,000,000.

The greatest development has been in the sardine fishery. The tuna packers of southern California last winter took up the canning of sardines as a side line to keep their canneries busy. On account of the long fishing season and the low cost at which sardines can be obtained, there is more profit in canning sardines than tuna. During the first six months of 1917 over 600,000 cases of sardines were packed and, as the last six months of the year are usually the best, the pack should reach 1,000,000 cases, with a wholesale value of $7,000,000.

Ours is a true sardine, and if properly packed is the equal of any, even the celebrated French sardine. So far the larger fish have been canned to the greatest extent, although a few canneries put up the smaller fish in olive oil in ¼-pound cans. These compare favorably with the best imported article.

The sardine packers of this state are alive to the fact that the industry is still in its infancy and that within a few years the pack can be increased to 3,000,000 cases. In order that the industry may be built up solidly on its merits and on the quality of the pack, the packers are endeavoring to form an organization along the lines of an association formed by the sardine packers of Maine, when it became necessary to put out a better quality

and a more uniform pack to save themselves from financial ruin. The proposed organization will have a system of inspection so that only prime fish will be packed and rigid sanitary rules will be enforced about the canneries and in handling the fish on the boats. On September 14 a delegation of sardine packers from southern California visited Monterey in a special car, the object in view being to look over the canneries and fishing methods of that section where the packers have had more years of experience. It was also their idea to complete the plans for the new organization, which they propose to make state-wide.

Several companies largely interested in fisheries in both the United States and Alaska have recently been investigating the sardine and tuna possibilities in this state, and it is certain that the next year will see some of them actively engaged in the business in California. Monterey Bay now has six sardine canneries, and it is very likely that this number will be increased in the near future. Two companies have already made application to the Monterey city council for water front space for canneries. According to a local paper, it is believed that large interests are behind the applications. One is said to be Libby, McNeil & Libby and the other the Alaska Packers.

All indications point toward a most wonderful development in the California fisheries for the year 1918.

COMMERCIAL FISHERIES ON THE MENDOCINO COAST.

Within the last year a cannery and two mild curing plants have been established at Noyo, Mendocino County, a mile and a half south of Fort Bragg, which is the shipping point, and if the proper steps are taken toward securing a navigable entrance to the Noyo River several more plants will be established at this point. There seems to be no question as to the supply of fish, and with a proper harbor for fishing boats, Noyo and vicinity will excel Monterey, particularly for salmon, according to fishermen now in this territory.

Up to within a year ago Noyo was practically unknown in so far as commercial fishing was concerned. Because this territory is new to most fishermen and on account of the poor entrance to the harbor the maximum number of boats there this year was only 100, but upon interviewing fishermen working in these waters it was learned that they all intend to return, and predict that double the number of boats will come for the 1918 season.

Shelter Cove, about forty miles up the coast from Noyo, is a very good fishing ground and a fair shelter for the boats during all weather conditions, except a southeaster. Freight boats carry the fishermen's catch to Noyo and return with provisions, gasoline, etc., and because of these boats plying between the fishing

Fig. 74. Fish cannery on Noyo River. New fishing grounds near the mouth of the Noyo River are increasing the fish industry in this vicinity. Photograph by H. O. Beckley.

ground and Noyo the fishermen can remain on the fishing ground constantly, or as long as they choose.

F. D. Small and D. C. Urie, both from Tillamook, Oregon, under the firm name of Small & Urie, have invested about $15,000 in a salmon cannery at Noyo and are equipped to handle 550 cases (maximum capacity) of salmon per day. At the present time they employ twenty-five people and could use a much larger force if they could get the fish, but because of the lack of fishing boats this cannery has never run to its full capacity. The run of salmon begins the latter part of June and ends the latter part of August, and from 600 to 1,000 pounds per boat in a day's fishing is not an unusual catch. This season one boat with two men caught 1,490 pounds in a single day's fishing. The price ranges from 6 cents to 9 cents per pound.

There are also two mild curing plants at Noyo. One, the Columbian Northern Fishing and Packing Company, with F. Klevenhusen of Altoona, Washington, for its president, represents an investment of about $12,000, and has a cold storage capacity of 125 tons. They manufacture their own ice and have a maximum capacity of 1,000 tierces per season. This plant does not operate any boats of its own and must depend upon outside fishermen for its supply. The Pacific Mild Cure Company of San Francisco has a plant here, but its pack was small this season, due mainly to lack of boats.

There were approximately 200 tons of salmon shipped from this territory fresh, beside that which was used by the cannery and the mild curing plants.

JAPAN FURNISHES FISH FOR ARMY.

Japan is furnishing Russia with fish for the use of her army. For the period of one year, from March, 1917, to March, 1918, it is estimated Russia will require 29,000,000 pounds of preserved fish, other than canned fish, in the following proportions:

15,000,000 pounds salted
9,500,000 pounds dried
4,500,000 pounds frozen

The Japanese salmon fisheries in Japan and Kamchatka have had a very prosperous season, and they are expecting to sell large quantities of canned salmon to England. The Japanese are evidently finding a very active market for their salmon for the price of salted salmon in the Hakodoti market has within a year risen from 12 pounds for 1 yen to 3 pounds for 1 yen, one yen being about 50 cents.

USE OF FISH BY OUR ARMY ADVOCATED.

"National Army to Be Well Fed" was the caption in one of the evening newspapers on Thursday, and in reading the list of foods to be furnished our soldiers

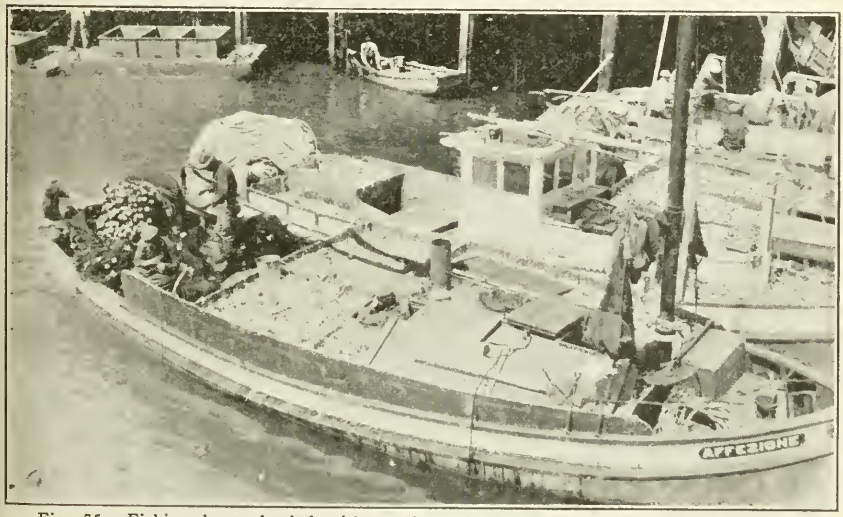

Fig. 75. Fishing boats loaded with sardines, San Pedro, California, August, 1917. Photograph by W. F. Thompson.

while in camp one is tempted to believe that in the matter of serving the inner man their wants will be taken care of as well or even better than if they were in their own homes. Apparently only one thing is lacking from the schedule prepared for ten days—and that is fish. With the government continually advocating the greater use of fish in order to conserve the meat supply, it is only natural to suppose that the commissary department of the United States army would pay some attention to the question of fish, particularly when it is generally known that Great Britain has purchased 14,000,000 pounds to be supplied by the United States.—*The Fishing Gazette.*

"EAT MORE FISH."

Under the heading "Eat More Fish" the Bureau of Fisheries sends out the following poster:

Fish is meat and has a high food value.

Analysis shows that fish meat contains as much body-building food as beefsteak.

Experiments show that fish is as readily digested as other meats.

You could replace all other meats with fish every day in the year without ill effects. There are more possibilities of increase in the meat supply by the fisheries than by any other one industry. The demand in the past has not equaled the supply.

Eat fresh fish if you are near the source of fresh fish, but don't expect to buy at a low price fresh fish that have to be shipped by express for long distances on ice. Consume your locally-caught fishes and don't all use the same kinds. The cheapest is often as good as or better than the dear.

Eat salt fish wherever you are. Write the Bureau of Fisheries for recipes for preparing salt fish for the table. If you eat meat for breakfast make it salt herring, salt mackerel, or other salt fish. Salt fish are good eating if you prepare them properly for the table. Do that.

Eat smoked fish. There is nothing better than fish prepared by this old-fashioned method. Smoked herring, smoked eels, smoked bowfin, smoked shark, smoked carp. The three last mentioned are just being introduced to the market. Make them go. Write for recipes for preparing smoked fish for the table.

Don't let Friday be the only fish day. Eat more fish more days a week.

Don't stand back on disagreeable names or ungainly appearances.

Prejudice is an expensive luxury. A shark would not taste any better if called by another name; it tastes good, as it is. Carp is good eating and nutritious. You will not find any fish on the market that is not fit to eat if it is in good condition. The best test of a good fish is not its name, but its freshness.

Look out for new fish. They are coming. Bowfin, grayfish, burbot, goosefish, shark, skate, sablefish, grouper.

Preserve fish in the home. Small-pressure canners are already in use by thousands of people. Put up a supply of fish when you can get them cheap. Can the roes, too; they are especially nutritious.

Eat fish—cultivate the taste—get the habit.

PRESERVING FISH WITHOUT ICE.

In the *Canadian Fisherman* for July, 1917, appears the following article on "Sherman's Method" of preserving fresh fish, which should be of interest to dealers in the present movement to increase the consumption of fish:

"PRESERVING FISH WITHOUT ICE OPPORTUNITY FOR THE SMALL PRODUCER.

"Sherman's Fish Sterilizing Company, Ltd., 1416 Standard Bank building, Vancouver, B. C., is the owner of the Henderson process for preserving fish without ice.

"A. H. Sherman, proprietor of the Defiance Packing Company, is the Britisher who introduced this process into Canada, being impressed with its importance from the fact that the Board of Agriculture and Fisheries, 43 Parliament street, London, England, reported in February, 1917, that 'there appears to be no ground for doubting Mr. Henderson's claim as to the practicability of the process on a commercial scale.' When a British government board puts its seal of approval on a fish preserving process it is good enough for all Britishers, is Mr. Sherman's opinion.

"Many tests with an experimental plant have been carried out in Vancouver, and their results have been satisfactory to all concerned. After a recent test, Mr. Sherman received the following unsolicited testimonial from Edward G. Taylor, inspector of Dominion fisheries, Nanaimo, B. C.:

"'The test proved entirely successful and the process was exceedingly simple, and no ice was used at any time during the process. I also ate salmon which had

gone through the process, and had been out of the water for fourteen days, and this salmon was just as fresh and firm as if it had been taken out of the water that very day. The bone of the salmon was strong, sound and sweet, proving conclusively that the process was entirely successful in preserving fish without ice for at least fourteen days, and from what I have seen, I have no doubt it would keep a very much longer time. I believe the process will be a great boon to the country and be an immense factor in the development of the fishing industry.'

"Some of the processed fish was expressed to W. A. Found, Department of Naval Service, Dominion Fisheries, Ottawa, and he wrote after sampling it: 'There was nothing in the taste of either fish that suggested to me that they had not been cured immediately following their being landed.'

"It is claimed by the owners of this patented process for preserving fish without ice that because no ice is needed the cost of preservation is lessened, and therefore, the fish can be sold cheaper.

"All the original flavor of the fish is maintained. The process applies to fresh and smoked fish, and also to meats, with which successful tests have already been made.

"The whole process from start to finish takes only three hours. Salt, low temperatures and sterilization are salient features of the process. First the fish is put into a cooling tank filled with water and brought to a low temperature. In half an hour the latent heat in the fish is extracted gradually and entirely. Then the fish is put into a second tank of sea water or fresh water strengthened by the addition of salt. In order to prevent freezing the water is agitated by a pump which draws it off through one pipe and drives it back again through another, passing through a filtering chamber charged with willow charcoal to kill the germs. The extremely low temperature of the salt solution seals up the pores of the fish and prevents saturation, acting as an antiseptic protection on the outside. After three hours the fish is taken out and presents a fresh appearance. It is impervious to decay for ten days, and may be kept in a cool room for months.

"Robert Mann, superintendent of the Henderson Process Plant at Dock street, Fleetwood, England, who installed the first plant at Lisbon, Portugal, writing under date of February 28, 1917, of the process of the Fleetwood plant says:

"'I can not speak too highly of the great success of this plant. Treated fish kept in excellent condition for a fortnight or longer in changing weather, the flavor being equal to that of newly caught fish; it never becomes flabby as in the

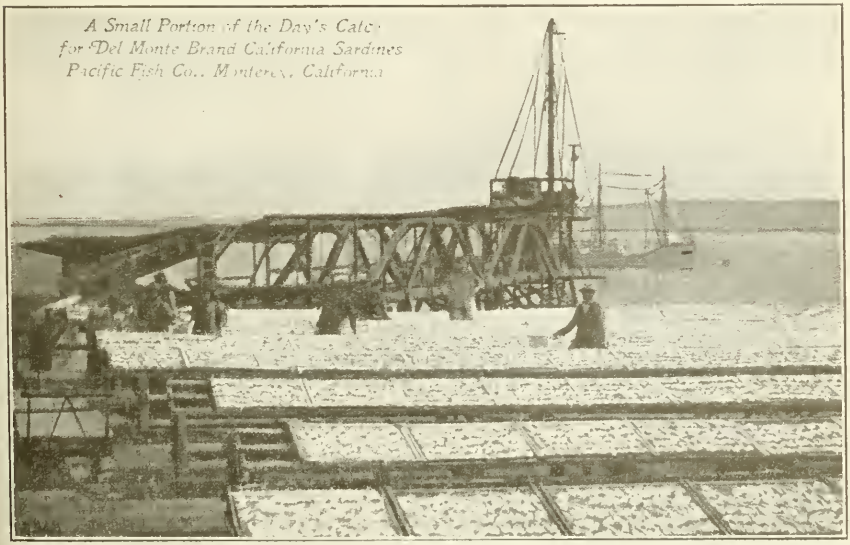

Fig 76. Part of a day's catch of sardines at Monterey, California.

case of fish that has been on ice. It is also admirably adapted for use in connection with smoked fish being first treated and then smoked. It keeps for a much longer time, especially in hot weather, and has a better flavor.'

"Mr. Sherman sees great possibilities in this process, for it is cheap to install and it will give the small producer of fish a means of preserving his catch so that he may reach the distant markets with his fish in good condition. He considers this process will not antagonize the cold storage companies, but will supplement the work they are doing in increasing the production of fish."

MISCELLANEOUS BRINE-SALTING.

All along the Atlantic coast of the United States a small local business is carried on in pickling fish for use during the winter in the homes of fishermen and their neighbors. Among the species thus prepared are bluefish, squeteague or sea trout, channel bass, croakers, perch, sheepshead, Spanish mackerel, striped bass, black bass, hogfish, etc. There is no uniform method of pickling, the fish being dressed, salted and packed according to the fancies and convenience of the curers, and the product rarely goes on the general market. In general, the fish are dressed by removing the head and viscera, and are split down the back or sometimes the belly, so as to lie out flat. They are next washed and soaked until the blood is removed and then covered with salt and placed in barrels, first a sprinkling of salt and then a layer of fish, and so on until the barrel is filled. Then brine is poured in to fill the interstices and the barrel is headed and coopered.—From "The Preservation of Fishery Products for Food," by C. H. Stevenson, in *The Bulletin of the U. S. Fish Commission*, for 1898, pp. 464–465.

UNITED STATES FOREST SERVICE COOPERATION.

MOUNTAIN LIONS KILL DEER.

During 1916, four deer were reported as being found in the Sierra National Forest which had been killed by mountain lions.

One cowman, while riding after cattle, saw a lion carrying a spotted fawn, so gave chase for about a mile. At one time he got as close as twenty feet from the lion, but still he stayed with the fawn, even though its feet were dragging on the ground, and the lion would occasionally step on them as he ran.

Last October this same cowman killed a black bear that weighed about 600 pounds, from which he fried out 40 pounds of lard.—C. E. Jordan.

CLEVELAND GAME REFUGE.

The Cleveland game refuge has shown the advantage of a protected area. The number of deer killed along the edge of the refuge was double the amount killed for the past several years.

The long open season on doves and quail is proving disastrous to the birds, especially the doves. The early shooting in September finds about 15 per cent of the doves still nesting. The largest part of the birds killed are half grown and full of pin feathers. What old birds that are killed are usually poor and many show signs of still nesting. In the early part of September I have found as high as ten doves still on the nest.

The logical thing to do is to combine the dove and quail season and not have over two months to hunt.

It is often claimed that the doves leave the open country early. They do, but they come back in November and December. The birds are then fat and full-grown.—J. B. Stephenson.

MOUNTAIN SHEEP AT HEAD OF KERN RIVER.

A band of mountain sheep range on the Kaweah Peaks, to the north and east of the Big Arroyo, in the Sequoia National Forest. Stockmen, who have been grazing their cattle in that vicinity for several years, believe there is a decided increase in the band, judging by the number of tracks observed.

These sheep are very wild. They stay in the rough country and are seldom seen. Thomas Smith, a stockman, reports seeing one late in the fall near Kennedy Meadows, on the south fork of Kern River, and it is believed that some of the band that spends the summer in the high peaks near the head of Kern River winter on the south slope of Olancha Peak and the Kennedy Meadows country.—F. P. Cunningham.

REPORTS.

NUMBER OF DEER KILLED IN VARIOUS COUNTIES DURING THE OPEN SEASONS, 1914-1916.

District No. 1.

County	1914	1915	1916
Alpine	39	66	‡70
Amador	36	43	64
Butte	39	26	‡30
Calaveras	202	111	179
Del Norte	*	‡225	‡250
El Dorado	300	109	82
Fresno	151	156	115
Humboldt	200	167	‡300
Inyo	40	‡131	54
Kern	235	121	375
Kings	14	1	31
Lassen	89	126	87
Madera	57	34	104
Mariposa	53	10	38
Merced	†	*	*
Modoc	160	106	106
Mono	152	4	6
Nevada	143	65	75
Placer	77	87	50
Plumas	200	93	276
Sacramento	30	*	*
San Joaquin	8	*	*
Shasta	357	492	425
Sierra	37	11	45
Siskiyou	575	665	378
Stanislaus	†	51	36
Sutter	*	*	*
Tehama	198	164	258
Trinity	725	543	508
Tulare	128	223	285
Tuolumne	203	174	311
Yuba	6	14	*
Totals	4,464	4,028	4,538

District No. 2.

Colusa	250	262	233
Glenn	90	215	170
Lake	161	84	193
Marin	370	‡325	194
Mendocino	268	‡500	350
Solano	14	5	*
Sonoma	436	360	131
Yolo	38	127	61
Napa	373	119	163
Totals	1,950	1,997	1,495

District No. 3.

County	1914	1915	1916
Alameda	8	‡125	‡125
Contra Costa	*	†	175
Monterey	632	595	91
San Benito	11	55	50
San Francisco	No	hunting	*
San Luis Obispo	60	155	167
San Mateo	5	55	150
Santa Clara	5	362	401
Santa Cruz	155	‡132	124
Totals	876	1,479	1,283

District No. 4.

Imperial	*	*	5
Los Angeles	143	95	153
Orange	24	*	20
Riverside	102	55	45
San Diego	45	44	35
San Bernardino	97	29	60
Santa Barbara	475	338	270
Ventura	*	172	213
Totals	886	733	801

Reports Unspecified as to Counties.

Shasta National Forest	87		
Lassen National Forest	13		
California National Forest	238		
Stanislaus National Forest	96		
Santa Barbara National Forest	89		
Sierra National Forest		106	
Totals	523	106	
Total for year 1914	8,699		
Total for year 1915		8,343	
Total for year 1916			8,117

*No record.
†Closed season.
‡Estimated.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Mexico	Total
Albacore											2,038,908		523,689		2,562,597
Anchovy			6,428				18,506		35,885		13,977				68,368
Barracuda									255	4,500	1,161,773	8,060	172,214	14,998	1,485,800
Bonito											3,092		335		3,427
Bocaccio							29,688		20,751						50,439
Bluefish							17,349								37,349
Chilipepper							113,687		2,540						116,227
Carp				13,008	16,273	20,124	13,836								63,241
Catfish		10,033		30,504	32,346	26,427									101,970
Sablefish						8,270	321,170	19,500	43						348,983
Cultus cod	80	2,596					77,480	29,038	21,243	800					131,237
Dogfish						2,936	17,280				5,385		696		26,297
Flounder	1,127		47	377	1,374	102,613	374,597	11,310	54		150	515			492,164
Halibut	4,222	11,415	101				14,690	3,220	3,949	54,485	398,575	16,020	168,891	489,920	1,254,388
Hake							16,400	15,300			947		11		32,658
Herring			349,619						8,460		1,010				359,089
Kingfish							18,812	14,415	79,317	2,000	165,630	800	7,135		288,139
Mackerel									1,327	1,200	304,816	2,200	602,322		911,865
Mullet							9,540						432		9,972
Pike				786	1,601	404									2,791
Pompano							7,210	5,530	1,084		11,757		835		23,416
Perch	12,287		8,859			171	3,096	14,415	3,216						42,344
Rock bass											54,141	1,985	114,286		170,412
Rockfish	8,971	2,595	764				132,737	52,211	158,146	8,930	635,971	7,168	214,737	80	1,222,310
Sole						60	933,027	421,045	5,295	1,000	8,537				1,368,934
Salmon	148	60,243		146,107	175,638	458,265	51,347	220,120	2,867,383						3,984,251
Smelt	5,412		4,266			1,080	50,097	11,532	7,695	25,695	10,292		7,225		186,614
Sea bass (white)							81		122	2,000	356,499	5,100	26,762		390,534
Sea bass (black)							63			259	1,890	1,500	52,657	34,780	91,152
Sandab			35				532,670	228,028	1,882	1,000	4,139	865			768,619
Striped bass			1,395	117,631	62,888	128,155	135,359		153						445,611
Shad				1,125,264	842,821	3,277,642	26,704								5,272,431
Sturgeon				567	1,766	3,846	68								6,247
Sardine							208		3,580,680		22,262,175		636,863		23,479,929

CALIFORNIA FISHERY PRODUCTS FOR APRIL, MAY AND JUNE, 1917—Continued.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Mexico	Total
Skate							52,653	150			2,060				54,863
Sculpin							5				5,789				5,794
Sea trout											769	500	968		2,237
Tom cod							3,503				8,770				12,273
Turbot			286												286
Whitebait		545	1,251				69,245	65							71,106
Yellowtail									3,974	250	248,630		9,441		232,355
Stingray			47,120												47,120
Miscellaneous	1,422	7,741		1,730	1,815		2,300	5,731	40		20,717		2,945	6 911	46,091
Total fish	33,699	95,168	420,171	1,436,004	1,136,522	4,041,993	3,224,121	1,051,610	6,803,494	144,819	27,756,488	44,713	2,539,447	549,889	49,334,930
Crustaceans—															
Crab (dozen)	5,084	125					13,778	2,027	274				17		*533,144
Spiny lobster											2,431		8,160	157,313	167,904
Shrimp							125,714								125,714
Ferevisse		70													70
Totals															826,832
Mollusks—															
Squid									235,724		45,294		665		281,683
Cuttlefish			48				1,275	3,051	2,855						7,229
Clam (Pismo)								985		71,561					72,546
Clam (cockle)			12,492							500	11,736				24,728
Clam (softsh ll)	14,700	3,686	176,293			20,560									215,239
Clam (mixed)			2.199				45			1,449		1,100			4,793
Oyster (shell)			2,283				1,075,200								1,077.483
Abalones		6,733							219,859	10,863					237,158
Mussels	4,200	1,933							2,010	2,153	15,265				203,019
Cal. oysters			21,882												21,882
Bay mussels			294			1,584	465								2,343
Totals															2,208 403

*Crab are estimated at 24 pounds to dozen.

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CITIZENS, non-resident of California	10.00 per year
ALIENS,	25.00 per year

ABSTRACT OF GAME LAWS (Sporting)

Variety	Dist.	Open Season (both dates included)	Bag limits, etc.
DEER	1, 23	Aug. 15 to Oct. 14	No does, fawns or spike bucks; no sale of meat. Two bucks per season.
	2, 3	Aug. 1 to Sept. 14	
	4	Sept. 1 to Sept. 30	
RABBITS (Cottontail and Brush)	All	Oct. 15 to Dec. 31	15 per day, 30 per week.
TREE SQUIRRELS	All	Sept. 1 to Dec. 31	12 per season.
ELK, ANTELOPE, MOUNTAIN SHEEP	All	No open season	Killing of elk a felony.
SEA OTTER	All	No open season	Penalty, $1000.00 fine.
DUCKS, GEESE, BRANT, MUDHENS	All	Oct. 15 to Jan. 31	Ducks and geese, 25 per day, 50 per week; honkers and sea brant, 12 per day, 24 per week.
WILSON SNIPE, BLACK BREASTED PLOVER, YELLOW LEGS, GOLDEN PLOVER	All	Oct. 15 to Jan. 31	15 per day, 30 per week.
RAIL, WOOD DUCK, WILD PIGEON	All	No open season	
VALLEY AND DESERT QUAIL	All	Oct. 15 to Dec. 31	15 per day, 30 per week.
MOUNTAIN QUAIL AND GROUSE	1, 23	Sept. 1 to Nov. 30	10 mountain quail per day, 20 per week; 4 grouse per day, 8 per week.
	2, 3, 4	Oct. 15 to Dec. 31	
SAGE HEN	All	Sept. 1 to Nov. 30	4 per day, 8 per week.
DOVE	All	Sept. 1 to Nov. 30	15 per day.

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ALIENS, over 18 years	3.00 per year

ABSTRACT OF FISH LAWS (Sporting)

TROUT WHITEFISH	23	June 1 to Oct. 31	20 Tahoe trout in one day in this or Dist. 1; other varieties limit as in other districts. No limit on whitefish.
TROUT (other than Golden)	1 and 4	May 1 to Nov. 30	50 fish or 10 pounds and one fish, or 1 fish of 10 pounds or over per day.
	2	May 1 to Oct. 31 Dec. 15 to Feb. 14	In Dist. 2, from Dec. 15 to Feb. 14, 2 fish per day.
	3	May 1 to Oct. 31	
GOLDEN TROUT	All	July 31 to Oct. 1	20 per day, 5 inches minimum length.
BLACK BASS	1, 2, 13	May 1 to Nov. 30	25 per day, 7 inches minimum length. No sale.
	3, 4	Mar. 2 to Nov. 30	
SACRAMENTO PERCH, SUNFISH CRAPPIE	All	May 1 to Nov. 30	25 per day. No sale.
SALMON	All except 15	No closed season for hook and line or spear	3 per day from Sept. 25 to Nov. 14. Hook and line only in Dist. 15.
	15	Apr. 15 to Aug. 31	
STRIPED BASS	All	No closed season	5 per day under 3 pounds any time; not more than 5 per day from Sept. 25 to Nov. 14. No sale or shipment under 3 pounds.
CATFISH, SHAD	All	No closed season	No size limit for hook and line.
CRABS	All	Nov. 15 to July 30	No females, and none less than 7 inches.
SPINY LOBSTER (Crawfish)	All	Oct. 15 to Feb. last	To be taken with crawfish traps only. None less than 9 nor more than 13½ inches in length.
ABALONE — Red	All	March 1 to Jan. 31	Size limit: Red, 19 inches; Green, 18 inches; Pink, 16 inches; Black, 14 inches. Dist. 19 and 20, daily limit of 10, but no black. No drying and no spears. For food only.
ABALONE — Green, Pink, Black	All	May 1 to Jan. 31	

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 3 Sacramento, July, 1917 Number 3

BOARD OF FISH AND GAME COMMISSIONERS.

Commissioners appointed by the Governor, by and with the consent of the Senate. Term at pleasure of Governor. No compensation.

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R. D. DUKE, Attorney.....San Francisco
A. D. FERGUSON, Field Agent.....Fresno

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E. W. HUNT, Field Agent, Dept. Fish Culture.....San Francisco
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F. A. SHEBLEY, Superintendent Mount Whitney Hatchery and Rae Lake Egg Collecting Station.....Independence
W. O. FASSETT, Superintendent Fort Seward Hatchery.....Fort Seward
G. E. WEST, Foreman in Charge Tallac and Tahoe Hatcheries.....Tallac
H. L. NEHF, Foreman in Charge Brookdale Hatchery.....Brookdale
E. V. CASSELL, Foreman in Charge Almanor Station.....Keddie
L. PHILLIPS, Foreman in Charge Bear Lake Station.....San Bernardino
R. I. BASSLER, Foreman in Charge Klamath Stations.....Hornbrook
JUSTIN SHEBLEY, Assistant in Charge Ukiah Hatchery.....Ukiah
J. B. SOLLNER, Assistant in Charge Wawona Hatchery.....Wawona

* * * *

SCREEN, LADDER AND WATER POLLUTION DEPARTMENT.

W. H. Shebley, in Charge.

A. E. DONEY, Fish Ladders.....San Francisco
A. E. CULVER, Fish Screens.....San Francisco
A. M. FAIRFIELD, Water Pollution.....San Francisco

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W. F. THOMPSON, Assistant.....Long Beach

STATE GAME FARM.

W. N. DIRKS, Superintendent, State Game Farm.....Hayward

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E. L. Bosqui, Commissioner in Charge. Carl Westerfeld, Executive Officer.
J. S. Hunter, Assistant Executive Officer. E. C. Boucher, Special Agent.
Head Office, New Call Building, San Francisco.
Phone Sutter 6100.

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B. H. Miller—Ukiah
E. V. Moody—Santa Cruz
W. J. Moore—Napa
J. E. Newsome—Newman
P. H. Oyer—Pacific Grove
Chas. R. Perkins—Fort Bragg
H. S. Prescott—Crescent City
Frank Shook—Salinas City
E. W. Smalley—Hanford
H. E. Foster—Launch "Quinnat," Vallejo
Chas. Bouton—Launch "Quinnat," Vallejo

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LOS ANGELES DIVISION.

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E. A. McKee, Assistant.
H. I. Pritchard, Assistant. Edwin L. Hedderly, Assistant.
Union League Building, Los Angeles.
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A. J. Stout—Los Angeles
Webb Toms—San Diego

HUNTERS' LICENSES

JULY 1st TO JUNE 30th

Obtain of County Clerks or Fish and Game Commission or Deputies

CITIZENS, resident of California	$1.00 per year
CITIZENS, non-resident of California	10.00 per year
ALIENS,	25.00 per year

Waterfowl only may be shot in District 4A.

ABSTRACT OF GAME LAWS (SPORTING).

Variety	District	Open season (both dates included)	Bag limits, etc.
Deer	1, 23, 24, 25, 26	Aug. 15 to Oct. 14	No does, fawns, spike bucks; no sale of meat. Two bucks per season.
	2, 3	Aug. 1 to Sept. 14	
	4	Sept. 1 to Sept. 30	
Tree Squirrels	All	Sept. 1 to Dec. 31	12 per season.
Elk, Antelope, Mountain Sheep, Sea Otter, Beaver.	All	No open season	Killing of elk, or possession of elk meat, a felony.
Rabbits (cottontail and brush), Valley and Desert Quail.	All	Nov. 15 to Jan. 31	15 per day; 30 per week.
Grouse	All	Sept. 15 to Oct. 14	4 per day; 8 per week.
Ducks, Geese, Brant, Mudhens, Wilson Snipe.	All	Oct. 16 to Jan. 31	Ducks and geese, 25 per day; 50 per week; honkers and sea brant, 12 per day; 24 per week.
Rail, Wood Duck, Wild Pigeon, Shore Birds (except Wilson Snipe).	All	No open season.	
Mountain Quail	1, 23, 24, 25, 26	Sept. 1 to Nov. 30	10 per day; 20 per week.
	2, 3, 4	Nov. 15 to Jan. 31	
Sage Hen	All except 4	Aug. 15 to Sept. 30	4 per day; 8 per week.
	4	No open season.	
Dove	All except 1	Sept. 1 to Nov. 30	15 per day.
	1	Aug. 1 to Oct. 31	

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YOUR DOLLAR FOR A HUNTING LICENSE HELPS

Enforce game laws.
Maintain and patrol twenty game refuges.
Restock depleted game covers.
Feed starving deer and quail.
Pay a bounty on mountain lions—the deer's worst enemy.
Maintain scientific investigations.
Rear and plant pheasants.
Educate school children and adults as to the need and value of game conservation.
Give publicity to game resources of the state.

YOUR DOLLAR SPENT FOR AN ANGLING LICENSE HELPS

Rear and plant millions of trout in streams of the state.
Rear and plant millions of salmon in streams of the state.
Maintain ten hatcheries and seven egg-collecting stations.
Prevent stream pollution.
Enforce fish laws.
Install fish ladders.
Install fish screens.
Maintain scientific investigations.
Transplant thousands of fish from overflowed areas.
Give publicity to fish resources of the state.

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